INTERPORE

INTERNATIONAL SOCIETY
FOR POROUS MEDIA

InterPore2019
11th ANNUAL MEETING

Photo courtesy: Pixabay

CONFERENCE PROGRAM
6-10 May 2019
Valencia, Spain

UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

anys

LOCAL ORGANIZING COMMITTEE

Jaime Gómez-Hernández (Chair), Universitat Politècnica de València

Eduardo Cassiraga, Universitat Politècnica de València

Zi Chen, Universitat Politècnica de València

Vanessa A. Godoy, Universitat Politècnica de València

María Elena Rodrigo-Clavero, Universitat Politècnica de València

Javier Rodrigo-Ilarri, Universitat Politècnica de València

Manuel Algarra, University of Malaga

Jesús Carrera, Spanish Scientific Research Council CSIC

Marco Dentz , Spanish Scientific Research Council CSIC

Pablo Ángel García-Salaberri, University Carlos III of Madrid

Francisco Gaspar, University of Zaragoza

Javier Samper, University of A Coruña

Jean Vaunat, Technical University of Catalonia

Luis Cueto-Felgueroso, Technical University of Madrid

PROGRAM COMMITTEE

Rainer Helmig (Co-Chair), Stuttgart University, Germany

Hadi Hajibeygi (Co-Chair), Delft University of Technology, Netherlands

Linda Abriola, Tufts University, USA

Rafid Al-Khoury, Delft University of Technology, Netherlands

Steffen Berg, Shell, Netherlands

Inga Berre, Bergen University, Norway

Michael Celia, Princeton University, USA

Al Cunningham, Montana State University, USA

Anozie Ebigo, ETH Zurich, Switzerland

Jaime Gomez-Hernandez, University of Valencia, Spain

Gennady Gor, New Jersey Institute of Technology, USA

Sorin Pop, University of Hasselt, Belgium

Karsten Thompson, Louisiana State University, USA

Jun Yao, China University of Petroleum, China

Welcome to Valencia!

WELCOME MESSAGES

Dear Colleagues,

On behalf of the International Society for Porous Media (InterPore), I welcome you to the 11th International Conference on Porous Media and Annual Meeting of the Society held in the beautiful city of Valencia.
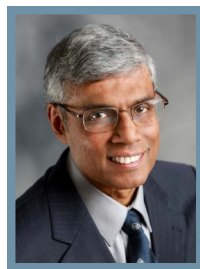
This will be my last annual meeting as the President of InterPore, and it was a privilege and honor to serve during the previous two years. Laura Pyrak-Nolte will begin her term as the President, though I will still be actively involved in InterPore affairs. I want to use this occasion to share with you the state of InterPore and some of my thoughts on the opportunities and challenges that we will face as we continue to grow.

Tissa H. Illangasekare
Colorado School of Mines

Thanks to the support and dedication of our members, InterPore is in great shape. Our society has become the world's leading organization that brings together a diversity of scientists from academia, industry, and research laboratories working on porous media problems. We now have more than 50 institutional memberships and 13 national chapters, from all parts of the world. With this growth, we had to add support staff in order to better serve our members. This critical need for organizational support has created some financial burden, which requires us to maintain a sound funding base that comes from membership fees and annual conference revenues. Thanks to the leadership of our Events Committee, Program Committee, and dedicated local organizing committees, we had very successful annual meetings. We were fortunate to hold these conferences at exciting venues, and for the first time, we will be holding an annual meeting outside North America and Europe: in Qingdao, China, in May 2020.

Our vision for the future remains the same: making InterPore the premier society for porous media science and technology. We have not fully capitalized on our potential to reach the full diversity of disciplines and industries with core porous media interests. We also need to make a concerted effort to attract more partners and members from the industry. We should strive to expand our membership and services to countries outside North America and Europe. Overall, we should allow InterPore to grow but at the same time keep it focused and maintain its character as a friendly organization where members benefit through acquiring new knowledge and build lasting professional and personal relationships. InterPore will continue to provide opportunities for students and young professionals to grow into the future generation of leaders and porous media scientists.

We are sincerely thankful to the Local Organizing Committee, led by Prof. Jaime Gómez-Hernández. Many institutions and companies are participating as sponsors and/or as exhibitors, and we sincerely thank them for their continuous support and commitment to InterPore. Special thanks are due to our Platinum sponsors: Kimberly-Clark Inc., Procter & Gamble, Shell, Thermofisher, and Delft University of Technology (Department of Geoscience and Engineering).

Your feedback on any aspects of our society and the meeting are valuable for us in order to improve our services to our members as well as our future meetings and activities. Thank you for your participation and commitment. We hope you will enjoy the conference and benefit from acquiring new knowledge, fruitful discussions and exchanges, and most importantly develop new relationships.

On behalf of the Executive Committee,
Tissa H. Illangasekare
*President of InterPore*

WELCOME MESSAGES

As chairman of the Local Organizing Committee, I wish to give you a warm welcome to Valencia and to this edition of the InterPore Annual Meeting. This conference is the major annual event of our Society as it offers a unique opportunity to meet new colleagues, reminisce with old friends and collaborators, and most importantly, exchange information, share findings, and develop new ideas and concepts through interactions. We are expecting close to 800 participants. We also have an exhibition with 10 participants. There will be plenty of opportunities for you to visit their stands and learn about the valuable services and products they are offering to the porous media community. We have an impressive week ahead of us, full of scientific activities and much more. The welcome dinner on Monday, the choir concert on Tuesday, and the fun 5K run on Wednesday will give us a chance to socialize away from the scientific activities. The program is dense, but I still hope that you have some time to enjoy the beauty of our city, stroll in the old quarters, and be amazed by the futuristic buildings in the City of Arts and Sciences. It has been an exciting year of preparations, with lots of work and many people involved to organize a congress experience for you that we hope you will remember for many years to come. Welcome to Interpore2019.

Jaime Gómez-Hernández
Universitat Politècnica de València

Jaime Gómez-Hernández
Chair of the Local Organizing Committee
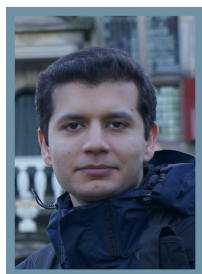
Hadi Hajibeygi
Delft University of Technology

Rainer Helmig
Stuttgart University

On behalf of the program committee, it is our pleasure to welcome you to the InterPore 2019 Conference. This year, the program committee have introduced invited mini-symposia in order to maximize the scientific coherency of the conference. We would like to acknowledge the effort of the mini-symposia organizers for joining the program committee in promoting the conference, reviewing the abstracts, and chairing the sessions. Thanks to their efforts, we have an exciting program with four plenary lectures, 15 invited presentations, 441 oral contributions, 296 posters, and five short courses.

Although we did our best to cover all existing InterPore disciplines and applications with the invited mini-symposia, our aim is to include more topics in our future annual meetings. In order to achieve this big goal, we will need contribution from all of you, InterPore members, to help us include new topics and applications. If you detect a missing subject, or a relevant industry, please let us know so we can find a way to include it in the next conference.

The success of InterPore has been always due to the individual members who participate and volunteer in the scientific and organizational activities. We look forward to hearing from you. Enjoy the conference!

Hadi Hajibeygi and Rainer Helmig
Co-Chairs of the Program Committee

INTERPORE Foundation

InterPore Foundation for Porous Media Science and Technology

The InterPore Foundation is a Non-profit, non-governmental, independent organization founded by the International Society for Porous Media in 2016. Our mission is to promote and support innovative research, support educational activities of InterPore society and finance awards for excellence and diversity in the broad field of porous media and for honoring distinguished talented researchers and lecturers.

The foundation also facilitates the participation of promising young scientists in international scientific gatherings hosted by InterPore, and supports outstanding scientists from countries with financial difficulties to join InterPore activities.

During the past year, the newly-formed InterPore Foundation continued the expansion of its activities and securing funds for InterPore awards, prizes, and grants. This has been made possible by generous grants from Proctor & Gamble, Kimberly-Clark Inc., and PoreLab (Norway), as well as some individuals. This year, InterPore Foundation provided ten conference grants to students and young scientists. The Foundation aims to increase both the number and amount of these grants in the coming years. This will only be possible with your help.

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Support our actions by making a donation to the Foundation through: www.interpore.org/foundation/foundation-donate. Your small contributions will have a huge impact on porous media science.

Steffen Berg
Chair of the Board of Directors

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Kimberly-Clark

P&G

Shell

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Department of Geoscience and Engineering

THANKS TO OUR SPONSORS

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IAHR **AIRH**

Soft Matter

Editor-in-chief
Darrin Pochan

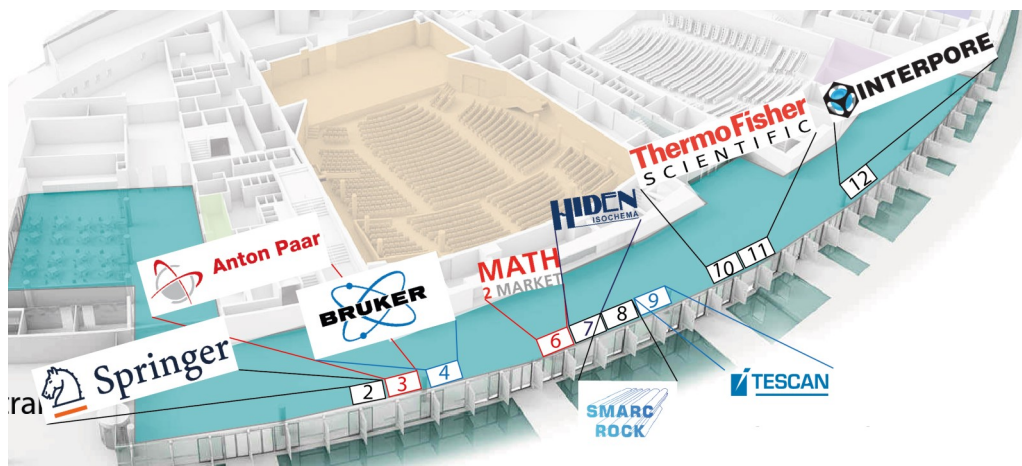*Must See sight: The Turia Gardens*

THANKS TO OUR EXHIBITORS

Master of Science in
Geo-Energy Engineering

TU Delft
Department of Geoscience and Engineering
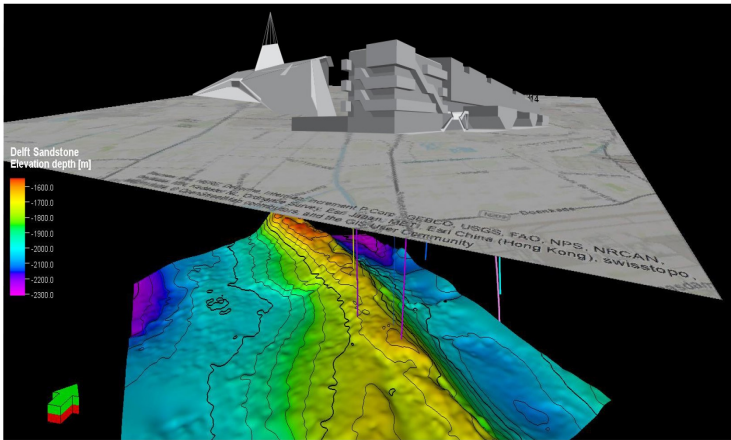

Subsurface geological formations are crucial sources of energy, such as geothermal, natural gas and petroleum. In addition, they provide giant volumes for large-scale storage of (renewable) energy and greenhouse gas. With growing demands for affordable energy and improvement of climate quality, the need for their sustainable utilisation is urgent. Geo-Energy engineers, the graduates of our MSc programme, are fully equipped to lead multi-disciplinary innovative engineering applications for subsurface formations in an environmentally responsible manner.

Degree	Master of Science
Starts	September
Type	full-time
Credits	120 ECTS, 24 months
Language	English
Application deadline	1 April
Tuition fee	€ 18.750 (non EU) € 2.083 (EU)
Scholarships	scholarships.tudelft.nl

More information:

Geo-Energy Engineering

Geo-Energy engineers characterise, simulate, predict and monitor processes in subsurface formations and their surrounding environment. They thoroughly study porous rocks, multiphase flows and fluid-rock interactions. They are multidisciplinary engineers who master not only physics and chemistry of the subsurface processes, but also advance geological and geo-physical methods to successfully implement complex engineering applications. They design engineering processes with minimum environmental risks in a responsible and sustainable manner. Since only a small fraction of the subsurface characteristics can be observed, reliable predictions under uncertainties is a unique skill they will develop during their course of study at TU Delft.
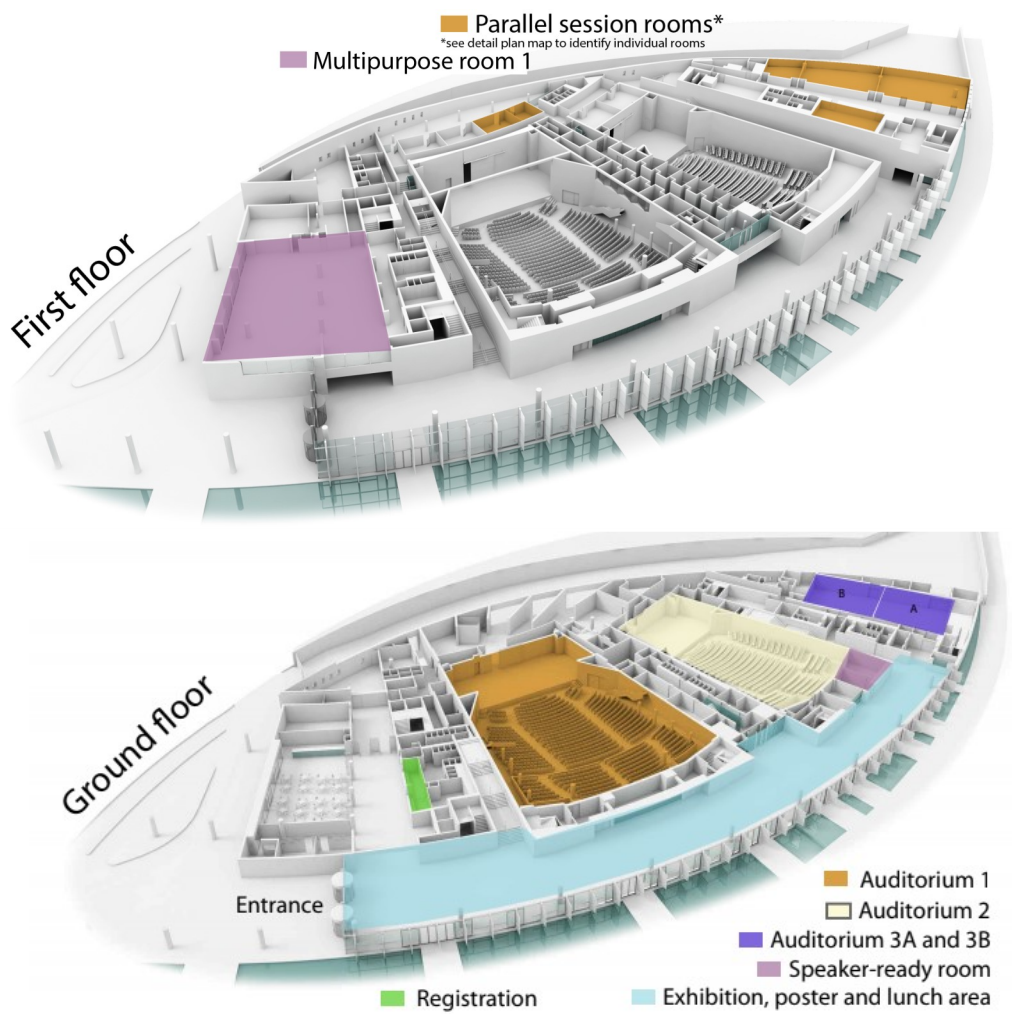
Details of the programme

Our programme is designed to be interdisciplinary, combining geoscience and engineering.
Our programme is built on our long history of world excellence in reservoir characterization, modeling and simulation, geophysical monitoring, geological characterisation, and laboratory study of the subsurface processes.
We welcome ambitious students with BSc in Applied Earth Sciences and all other related science and engineering degrees. The diverse backgrounds of our students provide a high-level learning environment with specialists in different disciplines working together. After a number of mandatory and elective specialised courses, most of the 2nd year is devoted to a thesis research project.
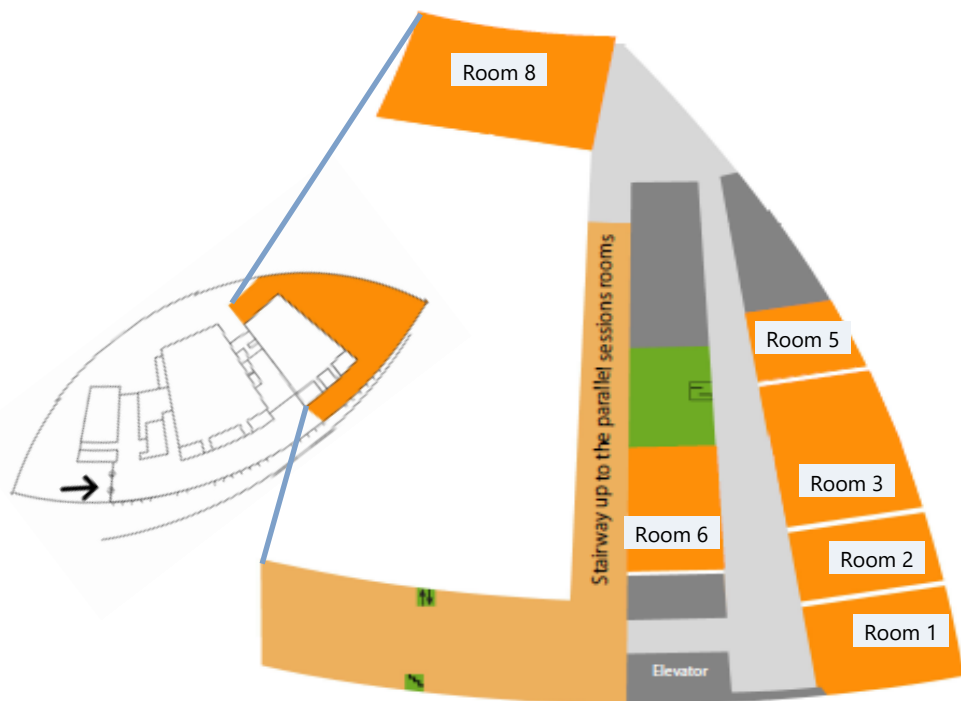
THE VENUE

The technical program of the conference will take place at the Valencia Conference Center, a building that won the prize for World's Best Convention Center in 2010 and in 2018, awarded by the International Congress and Convention Association. The building is an emblematic piece of architecture, designed by the renowned architect Norman Foster, specifically to attract event tourism to the city of Valencia.

VALENCIA CONFERENCE CENTRE
Avenida de las Cortes Valencianas, 60

Parallel session rooms*
*see detail plan map to identify individual rooms
Multipurpose room 1

First floor

Ground floor

Entrance

Registration

Auditorium 1
Auditorium 2
Auditorium 3A and 3B
Speaker-ready room
Exhibition, poster and lunch area

Room 8

Room 5

Room 6

Room 3

Room 2

Room 1

Stairway up to the parallel sessions rooms

Elevator

Detailed plan map for identification of individual rooms

MINI SYMPOSIA DESCRIPTIONS

(MS 1) Porous Media for a Green World: Energy & Climate
Organizers: Michael Celia, Curtis Oldenburg, Rainer Helmig, Hadi Hajibeygi

(MS 2) Porous Media for a Green World: Water & Agriculture
Organizers: Nima Shokri, Amilcare Porporato, Diogo Bolster

(MS 3) Flow, transport and mechanics in fractured porous media
Organizers: Inga Berre, Holger Steeb, Stefano Berrone, Hamid Nick

(MS 4) Swelling and shrinking porous media
Organizers: Sujit Datta, Chris MacMinn

(MS 5) Biochemical processes and biofilms in porous media
Organizers: Al Cunningham, Leon Van Paassen, Robin Gerlach, Adie Phillips, Anozie Ebigbo

(MS 6) Physics of multi-phase flow in diverse porous media
Organizers: Linda Abriola, Steffen Berg, Steven Bryant, Yaniv Edery, David A. Weitz

(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes
Organizers: Yalchin Efendiev, Sorin Pop, Paolo Zunino

(MS 8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media
Organizers: Marco Dentz, Branko Bijeljic

(MS 9) Pore-scale modelling
Organizers: Martin Blunt, Stephane Zaleski, James McClure

(MS 10) Advances in imaging porous media: techniques, software and case studies
Organizers: Veerle Cnudde, Dorthe Wildenschild, Melanie Britton

(MS 11) Microfluidics in porous systems
Organizers: Pietro Deanna, Vahid Niasar, Hassan Mahani

MINI SYMPOSIA DESCRIPTIONS

(MS 12) Advances in mathematical modeling and numerical simulation of poromechanics

Organizers: Florin Radu, Boris Gurevich, Francisco Gaspar, Joshua White

(MS 13) Fluids in Nanoporous Media

Organizers: Gennady Gor, Patrick Huber

(MS 14) Uncertainty Quantification in Porous Media

Organizers: Felipe Pereira, Marcio Rentes Borges, Arunasalam Rahunanthan

(MS 15) Machine Learning Advances in Porous Media

Organizers: Bailian Chen, Jianchun Xu, Xiaodong Luo, Olwijn Leeuwenburgh

(MS 16) Fluid Interactions with Thin Porous Media

Organizers: Nicolae Tomozeiu, Philippe Coussot, Marc Prat

(MS 17) Thermal Conductivity of Nanoscale and Microscale Porous Materials

Organizers: Guihua Tang, Jian Feng, Guilong Wang, Chul B. Park

(MS 18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers

Organizers: Christos Tsakiroglou, Olga Vizika Kavvadias, Marios Ioannidis

(MS 19) Electrochemical processes in porous media

Organizers: Ezequiel Medicil Pablo A. García-Salaberri, Andreas Wiegmann, Noushine Shahidzadeh

(MS 20) Biophysics of living porous media: theory, experiment, modeling and characterization

Organizers: Giuseppe Sciumè, Stefano Dal Pont, Alfio Grillo, Sylvie Lorthois

(MS 21) Special MS in honor of Prof. Martin Blunt

Organizer: Branko Bijeljic

(MS 22) Special MS in honor of Prof. Bernhard Schrefler

Organizer: Lorenzo Sanavia

MONDAY, 6 MAY 2019

Time	Multi-purpose room 1	Auditorium 3A	Auditorium 3B	Room 3	Room 1	Room 2	Room 6	Room 8	
10:00	Registration (open all days)								**Registration** *Available throughout all conference days*
12:00-13:00	Lunch								
13:00 – 13:15	**Plenary Session 1:** Auditorium 1 — **Chair:** Jaime Gomez-Hernandez								
13:15 – 13:55	**Opening Ceremony** — **Plenary Lecture:** Bernhard Weigand, University of Stuttgart								
13:55 – 14:00	**Plenary Pitch:** Margot Gerritsen, Stanford University								
14:15 – 15:45	MS 9	MS 6	MS 3	MS 7	MS 10	MS 11	MS 5	MS 13	
15:45 – 16:15	Coffee Break								
16:15 – 17:45	MS 9	MS 6	MS 3	MS 1	MS 10	MS 11	MS 5	MS 13	
17:50 – 19:00	**Annual Meeting of Society and Award Ceremony:** Auditorium 1								
19:00 – 22:00	**Conference Reception Dinner:** Exhibition Hall								

TUESDAY, 7 MAY 2019

Time	Multi-purpose room 1	Auditorium 3A	Auditorium 3B	Room 3	Room 1	Room 2	Room 6	Room 8	Exhibition Hall
08:30 – 09:10 / 09:10 – 09:15	**Plenary Session 2:** Auditorium 1 **Chair:** Margot Gerritsen **Plenary Lecture:** Dongxiao Zhang, Peking University **Plenary Pitch:** Bernd Flemisch, University of Stuttgart								*Exhibition & Posters available for visits*
09:20 – 10:50	MS 9	MS 6	MS 3	MS 8	MS 1	MS 5	MS 12	MS 17	
10:50 – 11:20	**Exhibition & Poster Session A:** Exhibition Hall *Coffee/Tea provided*								
11:20 – 12:50	MS 9	MS 6	MS 3	MS 7	MS 1	MS 20	MS 16		
12:50 – 14:00	**Lunch**								
				Invited Speakers					
14:00 – 14:30	Daniel Bonn *Auditorium 2*		Joshua White *Auditorium 3A*		Francisco Perez Reche *Auditorium 3A*		Veronika Schleper Room 3		
14:35 – 16:05	MS 9	MS 6	MS 22	MS 7	MS 1	MS 20	MS 16	MS 10	
16:10 – 17:00	Pitch 1	Pitch 1	Pitch 1	Pitch 1					
17:00 – 19:00	**Exhibition & Poster Session A; Poster authors present:** Exhibition Hall *Coffee/Tea (17:00-17:30) and refreshments including beer (after 18:00) provided*								
21:00	**Concert in Iglesia de la Compañía**								

WEDNESDAY, 8 MAY 2019

Plenary Session 3: Auditorium 1
Chair: Steffen Berg

Plenary Lecture: Tiina Roose, University of Southampton
Plenary Pitch: Veerle Cnudde, University of Gent

	Multi-purpose room 1	Auditorium 3A	Auditorium 3B	Room 3	Room 1	Room 2	Room 6	Room 8	Exhibition Hall
08:30 – 09:10 / 09:10 – 09:15									
09:20 – 10:50	MS 9	MS 6	MS3	MS 7	MS 8	MS 16	MS 19	MS15	*Exhibition & Posters available for visits*
10:50 – 11:20	**Exhibition & Poster Session B:** Exhibition Hall *Coffee/Tea provided*								
11:20 – 12:50	MS 21	MS 14	MS 12	MS 4	MS 15	MS 16	MS 19	SAC Career Event	
12:50 – 14:00	**Lunch**								
14:00 – 15:30	MS 9	MS 6	MS 8	MS 7	MS 2	MS 12	MS 4		
15:35 – 16:50	Pitch 2	Pitch 2	Pitch 2						
16:50 – 18:50	**Exhibition & Poster Session B; Poster authors present:** Exhibition Hall *Coffee/Tea (16:50-17:20) and refreshments including beer (after 17:50) provided*								
20:00	**1st InterPore 5K run:** More information on page 20								
21:00	**SAC event: Night out in Valencia:** Bear Club								

THURSDAY, 9 MAY 2019

	Sally Benson *Auditorium 2*	Jan Carmeliet *Auditorium 3A*			Matthias Thommes *Auditorium 3B*		Alexandre Tartakobsky *Room 3*		Exhibition Hall
08:30 – 09:00	**Invited Speakers**								
	Multi-purpose room 1	*Auditorium 3A*	*Auditorium 3B*	*Room 3*	*Room 1*	*Room 2*	*Room 6*	*Room 8*	*Exhibition & Posters available for visits*
09:10 – 10:40	MS 9	MS 6	MS 3	MS 8	MS 2	MS 11	MS 13	MS 19	
10:40 – 11:10	**Exhibition & Poster Session C:** Exhibition Hall *Coffee/Tea provided*								
11:10 – 12:40	MS 9	MS 6	MS 3	MS 8	MS 7	MS 11	MS 13		
12:50 – 14:00	**Lunch**								
14:00 – 15:30	MS 18	MS 14	MS 3	MS 8	MS 7	MS 11	MS 13		
15:35 – 17:00	Pitch 3	Pitch 3	Pitch 3	Pitch 3					
17:00 – 19:00	**Exhibition & Poster Session C; Poster authors present:** Exhibition Hall *Coffee/Tea (17:00-17:30) and refreshments including beer (after 18:00) provided*								
17:00 – 19:30	**SAC event: The Climate Challenge:** Room 8								

FRIDAY, 10 MAY 2019

	Invited Speakers						
08:45 – 9:15	Amilcare Porporato *Auditorium 2*	Jan Dirk Jansen *Auditorium 3A*		Charles Werth *Auditorium 3B*		Carmen Rodrigo Cardiel *Room 3*	
	Auditorium 3A	**Auditorium 3B**	**Room 3**	**Room 1**	**Room 2**	**Room 6**	**Room 8**
09:20 – 10:50	MS 9	MS 6	MS 7	MS 3	MS 1	MS 13	MS 18
10:50 – 11:15	**Coffee break**						
	Plenary Session 4: Auditorium 1 **Chair:** Sebastian Geiger						
11:15 – 11:55	**Plenary Lecture:** Joanna Aizenberg, Harvard University						
11:55 – 12:30	**P&G Student Poster Award and Closing Ceremony**						

Annual Meeting of Society and Award Ceremony
Monday, Auditorium 1 - 17:50 - 19:00

InterPore proudly presents the 2019 award winners:

InterPore Honorary Lifetime Membership Award
Rainer Helmig
Stuttgart University, Germany
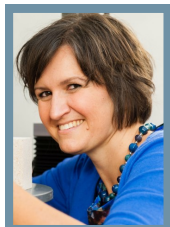
Kimberly-Clark Distinguished Lectureship Award
Veerle Cnudde
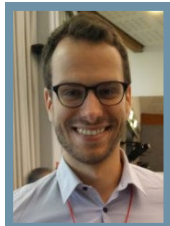*Gent University, Belgium*

Proctor & Gamble Award for Porous Media Research
Moran Wang
Tsinghua University, China

PoreLab Award for Young Researchers
Tom Bultreys
Gent University, Belgium

Conference Reception Dinner
Monday, Exhibition Hall - 19:00-22:00

P&G Student Poster Award
Friday, Auditorium 1 - 11:55

SOCIAL EVENTS

Acanthus Choir concert at Iglesia de la Compañía
Tuesday 21:00

The Acanthus Choir was established by members of the Messiah Participative concert that took place in Valencia ten years ago. Since then, they have performed pieces from all styles, both a capella and with musical ensembles, mostly in Valencia, but also elsewhere in Spain. The conductor is Josep Manel Campos.


Photo By Angel Tejo.

QR code to church address

1st InterPore 5K Run
Wednesday 20:00

The 5K InterPore Run is not a competitive event, nor are runners or times ranked. It is just another way to socialize among the participants of InterPore. Those participants who enjoy running will have the chance to jog around the main training camp for many of Valencia runners in the Old Riverbed Park. Others will simply enjoy cheering the runners and commenting on the outcome. Although formally part of the social activities of InterPore, the organization takes no responsibility and the run is at your own risk. Water will be available at the finish line.
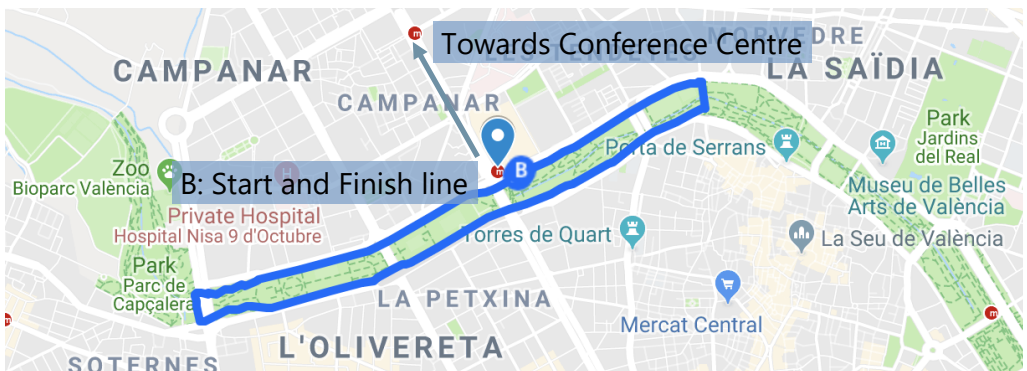
SHORT COURSES

1. Robust modelling of coupled nonlinear flow and transport processes in porous media; Introduction to DuMuX.

Monday, Room 2 - 8:30 - 12:00

Instructors:

Bernd Flemisch, Edward Coltman, Katharina Heck, Kilian Weishaupt, Melanie Lipp, Sina Ackermann

University of Stuttgart

2. Microfluidics: Experimental and numerical approaches of multi-phase flow and transport in porous media.

Monday, Room 6 - 8:30 - 12:00

Instructors:

Nikolaos Karadimitriou *(Stuttgart University)*

Ioannis Zarikos *(Eindhoven University of Technology)*

Andreas Yiotis *(National Center for Scientific Research "Demokritos")*

3. Digital Rock Analysis, Visualization and Simulation: Discover PerGeos Software.

Monday, Room 1 - 8:30 - 12:00

Instructors:

Federico Gamba *(Thermo Fisher Scientific)*

4. Introduction to Digital Rock Physics with LBPM.

Friday, Room 2 - 13:00 - 16:30

Instructors:

James McClure *(Virginia Tech)*

5. Pore Network Modeling with OpenPNM V2

Friday, Room 6 - 13:00 - 16:30

Instructors:

Jeff Gostick , Mehrez Agnaou, Zohaib Khan

University of Waterloo

In response to the excellent participation in the previous years, the Student Affairs Committee (SAC) will organize a set of activities during the 2019 InterPore meeting in Valencia. The SAC activities are **open to participants from all career stages,** from the early student to the experienced researcher/professor. They form the perfect setting for you to get to know the international porous media community better and expand your professional and personal network. Come along!

Career development event

Wednesday 11:20 - 12:50, Room 8

Many students struggle with the decision of which career path to follow after the PhD. Should I pursue an academic career or search for possibilities in the industry/governmental agencies? What are the pros and cons of each career path? What does life-after-PhD feel like? To help shed light on these big questions, the SAC has invited four established professionals to share their personal views and experiences. In this session we will NOT hear about their latest research results but instead about their different career paths and the important choices they had to make along the way.

Hadi Hajibeygi
Professor
Delft University of Technology

Noushine Shahidzadeh
Professor
University of Amsterdam

Sridhar Ranganathan
Technical Director
Kimberly-Clark

Ruben Juanes
Professor
MIT

Social night out after InterPore 5K run

Wednesday, 21:00 - 00:00, Bear Club

Experience from the previous years shows that a good informal night out is the best way to build new links between researchers (and strengthen the old ones too). So, quite simply, we will go to the bar! Did you join the InterPore run? Good, you must be thirsty. You didn't? No problem, everyone is welcome!

The place of choice is **Bear Club,** located at Carrer de la Vall de la Ballestera 25, close to the finish line.

Interactive game: the Climate Challenge

Thursday, 17:00 – 19:30, Room 8

The complicated problem of climate change involves a crucial trade-off between long-term sustainability and short-term economic growth. How would you handle the social dynamics of such complex issues? Step into the shoes of those who make key decisions for our planet. **Come play the Climate Challenge!** For this event there are a limited number of spots available. Preference will be will be given to PhD students or early career researchers with a maximum of 3 years since the completion of their PhD.

Would you like to join SAC and make InterPore 2020 even better? Contact sac@interpore.org

InterPore SAC 2019 Board Members

Chair
Marcel Moura
University of Oslo, Norway
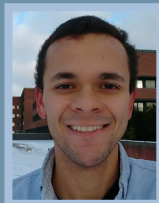
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Norwegian University of Science and Technology, Norway

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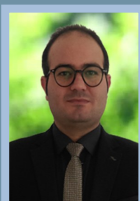*Norwegian University of Science and Technology, Norway*

Events Director
Marco Sauermoser
Norwegian University of Science and Technology, Norway

Communication Officer
Nasrollah Sepehrnia
Leibniz Universität Hannover, Germany

MONDAY, 6 MAY 2019

Plenary Session 1

Opening Session
Auditorium 1 - 13:00
Plenary Lecture
Auditorium 1 - 13:15
Chair: *Jaime Gomez-Hernandez*

Prof. Bernhard Weigand
Aerospace Engineering, University of Stuttgart

Numerical simulations of turbulent flows and heat transfer in regular porous structures.

Porous media can be found in nature with a broad range of geometrical characteristics and are also involved in many industrial and scientific applications with simplified regular structures. Such regular porous structures receive increasing importance because of manufacturing techniques based on selective laser melting. In several industrial applications, the pore-scale Reynolds number exceed the critical Reynolds number (which is about 300) and the flow in the porous structure is found to be turbulent. For such applications, the pore-scale flow and heat and mass transfer behavior is still not well understood. Here Direct Numerical Simulations (DNS) help to understand the complex flow features. For example, for a regular porous medium, consisting of square cylinders, DNS can be used for a very detailed flow analysis. In such investigations, it was found e.g. by anisotropy analysis using a barycentric map that the turbulence in porous media is highly isotropic in the macro-scale, but not in the micro-scale. After looking into the microscopic behavior, it is also very important to investigate the interaction between a porous structure and a free-flow. For example, the flow in a T-junction with a flow vertically discharged through a structured porous medium can be analyzed numerically. For such larger domains of course DNS would not be appropriate for case studies. Thus, Reynolds averaged Navier-Stokes (RANS) methods can be used. For such investigations, it is of particular interest to study the interface between porous structure and free channel flow. Numerical investigations can help in such configurations to understand e.g. the limitations of the Beaver-Joseph interface conditions and can help to find ways to improve it. This will then help improving models based on REVs to better capture the link between porous structures and free flows.

Plenary Session 1 *(cont.)*

Plenary Pitch
Auditorium 1 - 13:55
Chair: *Jaime Gomez-Hernandez*

Prof. Margot Gerritsen
Stanford Univeristy

Combusting in the Deep.
with a wee challenge to you

There are few systems of partial differential equations as interesting, and challenging, as those governing in-situ combustion (ISC). ISC is an environmentally friendlier alternative to steam injection for enhanced production of heavy oils. A part of the oil is burned in-situ to generate heat that reduces oil viscosity and often also leads to in-situ upgrading of the hydrocarbons. The ISC process involves flow and transport of multiple strongly interacting phases. The chemical reactions and intrinsic reservoir properties render the systems fiercely multi-scale also.

Our poster will give you an introduction to this fascinating research topic. We conduct research experimentally, to learn more about the intricate physics, as well as computationally, to predict process performance and develop new numerical tools (which can often be applied to similar systems of PDEs arising in other applications). The poster will contain a wee challenge to you also, with a prize, which we will explain in the poster pitch on Monday.

MONDAY, 6 MAY 2019

Oral presentations: Parallel sessions 1

MS 9: Pore-scale modelling - Part 1
*Multipurpose room 1 - **Chairs:** Martin Blunt, Stephane Zaleski*

14:15 — [11] **Pore-scale modeling of catalytic filters for automotive exhaust gas aftertreatment.**
Petr Koci; Marie Placha; Marek Vaclavik; Martin Sourek; Martin Isoz; Milos Svoboda; Emily Price; David Thompsett

14:33 — [22] **Multiscale dentinal porous medium modeling using image restoration techniques.**
Elsa Vennat; Denis Aubry

14:51 — [238] **Development of a 3D dual pore–system leaching model with application on metal extraction from an oxide copper ore.**
Xiuxiu Miao; Baohua Yang; Guillermo Narsilio; Aixiang Wu

15:09 — [131] **Insights into evaporation from the surface of capillary porous media gained by discrete pore network simulations.**
Xiang Lu; Abdolreza Kharaghani; Evangelos Tsotsas

15:27 — [439] **Pore-filling model for micro-structure of cement hydration using level-set.**
Nguyen-Tuan Long; Christiane Roessler; Merlin Etzold; Horst-Michael Ludwig

MS 6: Physics of multi-phase flow in diverse porous media - Part 1
*Auditorium 3A - **Chairs:** Steffen Berg, Rasoul Arabjamaloei*

14:15 — [3] **Fluid displacement and trapping during two-phase steady-state flow in complex carbonate imaged by synchrotron x-ray microtomography.**
Yili Yang; Ian Butler; Florian Fusseis; Rink van Dijke; Sebastian Geiger; Xianghui Xiao

14:33 — [302] **Dynamic measurements of drainage capillary pressure curves in carbonate rocks.**
Sayed Alireza Hosseinzadeh Hejazi; Ronny Pini; Saurabh Shah; Ronny Pini

14:51 — [304] **Effective steady-state flow regimes during the stranding and mobilization of NAPL ganglia within stochastically reconstructed porous domains.**
Andreas Yiotis; Anastasia Dollari; Laurent Talon; Dominique Salin

15:09 — [348] **Dynamic pore-scale flow regimes study during steady-state multiphase flow using synchrotron X-ray micro-tomography.**
Ying Gao; Qingyang Lin; Branko Bijeljic; Martin Blunt

15:27 — [451] **Dynamic interface rearrangement during steady-state multi-phase flow in porous media.**
Catherine Spurin; Sam Krevor; Martin Blunt; Branko Bijeljic; Tom Bultreys

Oral presentations: Parallel sessions 1 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 1
*Auditorium 3B - **Chairs:** Inga Berre, Holger Steeb*

14:15	[537] **3D model-based interpretation of tracer tests in large undisturbed columns from fractured clayey till.** *Klaus Mosthaf; Peter Jorgensen; Chloe Lanters; Nora Badawi; Jens Aamand; Massimo Rolle*
14:33	[384] **Apparent Permeability Model of Complex Fracture Network in Shale Reservoir.** *Jianchun Guo; Fanhui Zeng; Fan Peng;*
14:51	[779] **Coupled Electrohydrodynamic transport through fractures.** *Uddipta Ghosh; Tanguy Le Borgne; Yves Meheust*
15:09	[68] **An efficient numerical simulator based on embedded discrete fracture model for fractured karst carbonate reservoirs.** *Zhaoqin Huang; Jun Yao; Lijun Liu; Liang Gong; Huang Tao; Xiaoguang Wang; Herve Jourde*
15:27	[772] **CO2 injection impairment: simple model for fracturing risk associated with mineral dissolution and precipitation.** *Pierre Cerasi*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 1
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

14:15	[9] **Flow and heat transfer in a microchannel partially filled with a microporous foam involving effects of flow inertia, flow/thermal slips, thermal non-equilibrium and thermal asymmetry.** *Huijin Xu; Changying Zhao; Kambiz Vafai*
14:33	[118] **Pore Scale Simulation of Coupled multiple physicochemical processes for Methane Hydrate Dissociation using Lattice Boltzmann Method.** *Lei Zhang; Chuangde Zhang; Kai Zhang; Jun Yao*
14:51	[191] **Consistent discretization of flow for inhomogeneous gravitational fields.** *Michele Starnoni; Inga Berre; Eirik Keilegavlen; Jan Martin Nordbotten*
15:09	[132] **Hybrid models for simulating blood flow in microvascular networks.** *Tobias Koeppl; Barbara Wohlmuth; Ettore Vidotto; Rainer Helmig; Timo Koch*
15:27	[497] **Numerical Simulation of fluid flow in unsaturated porous media using the SPH method.** *Tobias Bernd Wybranietz; Sabine Przybilla; Pierre Sabrowski; Joachim Villwock*

MONDAY, 6 MAY 2019

Oral presentations: Parallel sessions 1 *(cont.)*

MS 10: Advances in imaging porous media: techniques, software and case studies - Part 1
*Room 1 - **Chairs:** Melanie Britton, Veerle Cnudde*

14:15　[444] **Dynamic synchrotron microtomography for direct in-situ capillary flow visualization in functionalized porous material for passive microfluidics.**
Agnese Piovesan; Tim Van De Looverbosch; Pieter Verboven; Clement Achille; Elodie Boller; Yin Cheng; Rob Ameloot; Bart Nicolai

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14:33　[104] **Positron Emission Tomography in Water Resources and Subsurface Energy Resources Engineering Research.**
Christopher Zahasky; Takeshi Kurotori; Ronny Pini; Sally M. Benson

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14:51　[224] **Fast artificial μCT-scans from 3D-structure models using Gaussian Random Fields.**
Andreas Weber; Andreas Wiegmann; Nicolas Harttig; Christian Wagner

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15:09　[231] **Influence of yarn configuration on wicking processes studied by fast X-ray micro-tomography.**
Robert Fischer; Christian M. Schlepütz; Dominique Derome; Rene M. Rossi; Jan Carmeliet

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15:27　[215] **Simultaneous determination of pore space and tortuosity fractal dimensions based on 3D CT images.**
Yuxuan Xia; Jianchao Cai; Wei Wei

MS 11: Microfluidics in porous systems - Part 1
*Room 2 - **Chairs:** Pietro de Anna, Vahid Niasar, Hassan Mahani*

14:15　[284] **Dissipative processes during two-phase flows: microfluidic experiments.**
Sophie Roman; Cyprien Soulaine; Anthony Kovscek

14:33　[244] **Fast 4D Micro-Tomography Imaging of Anomalous Transport in Partially-Saturated Porous Media.**
Sharul Nizam Hasan; Vahid.J Niasar; Jose Godinho; Holger Steeb; Nghia Vo; Nikolaos Karadimitriou; David Uribe; Maria Osorno

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14:51　[176] **Karst-on-a-chip: microfluidic studies of dissolution of an analogue fracture.**
Piotr Szymczak; Florian Osselin; Filip Dutka; Silvana Magni; Max Cooper

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15:09　[48] **Two-phase electrohydrodynamics in complex geometries – modelling and simulation.**
Gaute Linga

15:27　[133] **Fracture-matrix flow interaction characterizations using a temporo-ensemble PIV method.**
Mehrdad Ahkami; Martin O. Saar; Xiang-Zhao Kong

Oral presentations: Parallel sessions 1 *(cont.)*

MS 5: Biochemical processes and biofilms in porous media - Part 1
*Room 6 - **Chairs:** Al Cunningham; Leon van Paassen*

14:15	[134] **The influence of flow on bacterial transport and surface colonisation in a model porous medium.** *Eleonora Secchi; Rusconi Roberto; Roman Stocker*
14:33	[226] **A microfluidic study on biofilm and preferential flow path formation in porous media.** *Dorothee Luise Kurz; Eleonora Secchi; Vicente Fernandez; Roman Stocker; Joaquin Jimenez-Martinez*
14:51	[356] **Microbial ecology of seawater flooded petroleum reservoirs: a modelling and field study.** *Jahanbani Veshareh Moein; Hamid M. Nick*
15:09	[705] **Investigation of the Erodibility of Fungal Treated Soils Using a Laboratory JET Apparatus.** *Grainne El Mountassir; Emmanuel Salifu; Alexandra Schellenger; Livia Adinolfi; Raniero Beber; Alessandro Tarantino*
15:27	[33] **Bone Dry: Hydroxyapatite as a Water-Resistant Cement Coating Material.** *Ronald Turner; Joanna Renshaw; Alan Richardson; Andrea Hamilton*

MS 13: Fluids in Nanoporous Media- Part 1
*Room 8 - **Chairs:** Gennady Gor, Patrick Huber*

14:15	[138] **Binary solvents in nanoporous confinement: how different are they?** *Denis Morineau; Aicha Jani; Ramona Mhanna; Sujeet Dutta; Ronan Lefort; Ilham Essafri; Aziz Ghoufi; Patrick Huber; Michael Froba; Bernhard Frick; Laurence Noire*
14:33	[105] **Capillary Stress and Structural Relaxation in Disordered Porous Materials.** *Edmond Tingtao Zhou; Katerina Ioannidou; Martin Bazant; Roland Pellenq*
14:51	[330] **Experimental gas permeability studies on synthetic microporous materials.** *Steffen Nolte; Yue Wang; Reinhard Fink; Bernhard M. Krooss; Alexandra Amann-Hildenbrand; Moran Wang; Joyce Schmatz; Jop Klaver*

MONDAY, 6 MAY 2019

Oral presentations: Parallel sessions 2

MS 9: Pore-scale modelling - Part 2
*Multipurpose room 1 - **Chairs:** Stephane Zaleski, James McClure*

16:15	[839] **Pore-scale imaging and measurement of relative permeability in a mixed-wet carbonate reservoir rock at reservoir conditions.** *Amer Alhammadi; Ying Gao; Martin Blunt; Branko Bijeljic*
16:33	[707] **Effective elastic parameters of porous heterogeneous materials computed from tomographic image large datasets using personal computers.** *Andre Pereira; Ricardo Leiderman; Rodrigo Azeredo*
16:51	[708] **The Porous Microstructure Analysis (PuMA) software for high-temperature microscale modeling.** *Joseph C. Ferguson; Francesco Panerai; John Thornton; Federico Semeraro; Arnaud Borner; Nagi N. Mansour*
17:09	[801] **Pore-scale investigation of the surface roughness impacts on reaction rate.** *Priyanka Agrawal; Till Bollermann; Amir Raoof; Oleg Iliev; Cornelius Fischer; Mariette Wolthers*
17:27	[852] **Multiphysics modeling of porous media acid dissolution: the effects of acid fluid properties and geometry on wormhole formation and directionality.** *Aslak Stubsgaard; Hamid M. Nick*

MS 6: Physics of multi-phase flow in diverse porous media - Part 2
*Auditorium 3A - **Chairs:** Ryan Armstrong, Alessio Scanziani*

16:15	[29] **Shear thickening of flexible coiled polymer solutions in non-inertial shear and extensional flows.** *Eseosa Eguagie; Steffen Berg; John Crawshaw; Shauvik De; Paul Luckham*
16:33	[70] **Transport mechanism of emulsion micro-gel particles: Synergistic effect of emulsion and micro-gel particle.** *Wenhai Lei; Chiyu Xie; jinling Zhou; Moran Wang*
16:51	[742] **Viscous fingering in a soft porous medium.** *Christopher W. MacMinn; Jian Hui Guan*
17:09	[956] **Upscaling transport of nanoparticles in porous media.** *Seetha N*
17:27	[272] **Effective Rheology of Bi-Viscous Non-Newtonian Fluids in Porous Media.** *Laurent Talon; Alex Hansen*

Oral presentations: Parallel sessions 2 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 2
*Auditorium 3B - **Chairs:** Stefano Berrone, Hamid Nick*

16:15	[544] **A stabilized mixed formulation for phase-field modeling of fracture in porous media.** *Claudio Gavagnin; Lorenzo Sanavia; Laura De Lorenzis*
16:33	[28] **Phase-field modeling of shrinkage-induced cracking in cement mortar.** *Tuanny Cajuhi; Pietro Lura; Laura De Lorenzis*
16:51	[631] **Finite element/finite volume framework for phase-field fracture in saturated porous media.** *Juan Michael Sargado; Eirik Keilegavlen; Inga Berre; Jan Martin Nordbotten; Robert Kloefkorn*
17:09	[322] **Towards a continuum-mechanical model of fluid-driven fracture for fully and partially saturated porous materials.** *Alixa Sonntag; Arndt Wagner; Chenyi Luo; Wolfgang Ehlers*
17:27	[145] **Numerical Modelling of Coupled Flow and Fluid-Driven Fracturing in Fractured Porous Media using the Immersed Body Method.** *Asiri Obeysekara; Pablo Salinas; Jiansheng Xiang; J.P. Latham; Christopher C. Pain*

MS 1: Porous Media for a Green World: Energy & Climate - Part 1
*Room 3 - **Chairs:** Rainer Helmig, Hadi Hajibeygi*

16:15	[577] **Effect of precipitation mineralization reactions on convective dissolution of CO2: an experimental study.** *Anne De Wit; Carelle Thomas; Dehaeck Sam*
16:33	[737] **Experimental study of the influence of flow rate, temperature and pressure on the carbonation of natural serpentinites induced by CO2 geological storage.** *Florian Osselin; Michel Pichavant; Mohamed Azaroual*
16:51	[814] **Study on salt precipitation behavior during carbon dioxide injected into underground porous media.** *Di He; Peixue Jiang; Ruina Xu*
17:09	[130] **CO2–Induced Structure Alteration of Oil Well Cement: a Micro CT Study.** *Yan Wang; Liwei Zhang; Xiuxiu Miao; Xiaochun LI*
17:27	[361] **Conservative multirate multiscale method for multiphase flow in heterogeneous porous media.** *Ludovica Delpopolo Carciopolo; Luca Formaggia; Anna Scotti; Hadi Hajibeygi*

MONDAY, 6 MAY 2019

Oral presentations: Parallel sessions 2 *(cont.)*

MS 10: Advances in imaging porous media: techniques, software and case studies - Part 2
*Room 1 - **Chairs:** Melanie Britton, Veerle Cnudde*

16:15	[225] **The influence of nominal resolution and focal spot size on analysis results in porous media.** *Wesley De Boever; Andreas Griesser*
16:33	[333] **Using nanoCT and high contrast imaging to inform microporosity permeability during Stokes-Brinkman single and two-phase flow simulations on microCT images.** *Hannah Menke; Ying Gao; Sven Linden; Matthew Andrew*
16:51	[409] **SoilJ - A software for the semi-automatic processing and analyses of X-ray images of soil samples.** *John Koestel*
17:09	[471] **Pore-by-pore investigation of multiphase flow characteristics using dynamic micro-computed tomography.** *Arjen Mascini; Tom Bultreys; Stefanie Van Offenwert; Stephan Lunowa; Iuliu Sorin Pop; Veerle Cnudde*
17:27	[509] **The fluorescence microscopy toolkit in investigations of paper: High-speed, super-resolution and 3D imaging.** *Tobias Meckel; Marcel Krausse; Andreas Geissler; Markus Langhans; Samuel Schabel; Markus Biesalski*

MS 11: Microfluidics in porous systems - Part 2
*Room 2 - **Chairs:** Pietro de Anna, Vahid Niasar, Hassan Mahani*

16:15	[363] **Biofilm architectural differentiation in porous systems.** *David Scheidweiler; Hannes Peter; Pietro De Anna; Tom Battin*
16:33	[312] **New Capillary Number Definition for Micromodels: the Impact of Pore Microstructure.** *Jinyu Tang; Michiel Smit; Sebastien Vincent-Bonnieu; William R. Rossen*
16:51	[38] **Formation dry-out and salt precipitation in porous and fractured media: Laboratory insights on physics and dynamics of CO2-induced halite accumulations.** *Mohammad Nooraiepour; Hossein Fazeli; Rohaldin Miri; Helge Hellevang*
17:09	[397] **Screening of EOR Potential on the Pore Scale - Application of Microfluidics to Alkaline Flooding.** *Holger Ott; Ahmad Kharrat; Mostafa Borji; Torsten Clemens; Pit Arnold*
17:27	[524] **Unconventional transport mechanisms in porous media: connectivity enhancement due to thin film flow.** *Marcel Moura; Knut Jorgen Maloy; Eirik Flekkoy; Gerhard Schafer; Renaud Toussaint*

Oral presentations: Parallel sessions 2 *(cont.)*

MS 5: Biochemical processes and biofilms in porous media - Part 2
*Room 6 - **Chairs:** Ebigbo Anozie; Al Cunningham*

16:15 | [530] **Numerical modelling of microbially induced calcite precipitation in field trials.**
Leon van Paassen; Chen Zeng; Jun-jie Zheng

16:33 | [486] **MICP in the Field: continuous injection to reduce permeability and enhance wellbore integrity.**
Catherine Kirkland; Randy Hiebert; Robert Hyatt; Jay McCloskey; Jim Kirksey; Alfred B. Cunningham; Robin Gerlach; Lee Spangler; Adrienne Phillips

16:51 | [82] **Investigating induced calcium carbonate precipitation with a focus on changing hydraulic properties.**
Johannes Hommel; Felix Weinhardt; Robin Gerlach; Holger Steeb; Holger Class

17:09 | [434] **Modelling microbially enhanced coal-bed methane production: From a validated batch model to column scale.**
Simon Scholz; Katherine Davis; Johannes Hommel; Robin Gerlach; Al Cunningham; Holger Class; Rainer Helmig

17:27 | [510] **Microbial Growth and its Influence on Hydraulic Properties in Saturated Porous Media – a Microfluidic Study.**
Neda Hassannayebi; Schritter Johanna; Martin Ferno; Frieder Enzmann; Andreas Loibner; Holger Ott

MS 13: Fluids in Nanoporous Media- Part 2
*Room 8 - **Chairs:** Gennady Gor, Patrick Huber*

16:15 | [738] **Non-wetting liquid flow in nanoporous media under the impulse pressure change.**
Vladimir D Borman, Anton A Belogorlov, Nikolai Yu Demin

16:33 | [431] **Imbibition, pervaporation and drying in 3 nm diameter pores.**
Olivier Vincent; Bastien Marguet; Alexandre Szenicer; Theo Tassin; Abraham Stroock

16:51 | [844] **Surface influence on the dynamics of molecules confined inside mesoporous xerogels: low field NMR investigations.**
Ioan Ardelean; Calin Cadar

17:09 | [513] **Multiscale Porosity Measurements in Shale Rocks using Gas Adsorption and Mercury Intrusion Porosimetry.**
Nicolas Chanut; Thibaut Divoux; Renal Backov; Jeffrey Kenvin; Franz Ulm; Roland Pellenq

17:27 | [538] **Density Functional Theory for Fluid Adsorption on Rough Surfaces.**
Timur Aslyamov; Aleksey Khluypin; Vera Pletneva

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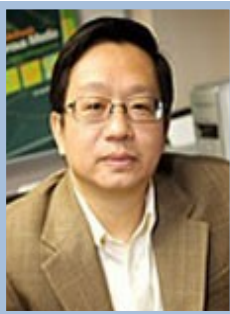shell.com/careers
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TUESDAY, 7 MAY 2019

Plenary Session 2

Plenary Lecture

Auditorium 1 - 08:30
Chair: *Margot Gerritsen*

Prof. Dongxiao Zhang

Energy and Resources Engineering
Peking University

Machine Learning Physical Processes and Governing Equations from Data for Flow in Porous Media

Porous flow problems may consist of several physical processes. Some of such processes may be described by rigorous models derived from first principles or conservation laws. However, this may not be true for complex processes, for which approximate or empirical models are usually proposed based on theoretical considerations, lab experiments, or data analyses. Alternative models of various accuracies or complexities may be proposed for the same physical process by considering different conditions, and these models usually have several model parameters. For the specific occurrence of a physical problem, it may not be clear about which processes occurred (or dominated). And, which is the proper empirical model among the alternatives for a specific process? Also, what are the values of the corresponding model parameters? In this work, an integrated framework is developed that combines the data driven (machine learning) and data assimilation (inverse modeling) methods for simultaneously identifying physical processes and inferring model parameters. Spatiotemporal data is first divided into training data set and testing data set. And, using the training data set, a data driven method is developed to learn the governing equation of the considered physical problem by identifying the occurred (or dominated) processes and selecting the proper empirical model(s). Via introducing a prediction error of the learned governing equation for the testing data set, a data assimilation method is devised to estimate the uncertain model parameters of the selected empirical model. For the subsurface flow and contaminant transport problems investigated, the results show that the proposed method can identify the underlying physical processes adequately. We further extend the proposed method for data driven discovery of governing equation with uncertain parameters in the presence of measurement errors, and satisfactory results are obtained.

Plenary Pitch

Auditorium 1 - 09:10
Chair: *Margot Gerritsen*
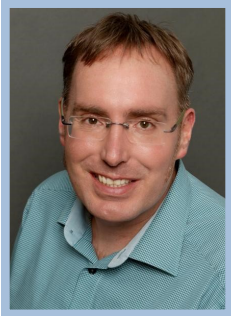
Prof. Bernd Flemisch

University of Stuttgart

Integrating publication, software and data in simulation sciences

While the process of publishing scientific findings in form of journal articles can be considered to be mature, this doesn´t hold in general for the supplementary material associated with such an article. In porous-media modeling, this material may consist of the software that has been used to produce the presented results as well as data such as simulation results or experimental measurements used for model validation. Although methods and tools for developing and publishing research software as well as for managing research data already exist and are under continuous development, standardized workflows for their employment in porous media modeling are still in their infancy. Especially the integration of the three components publication, software and data poses special challenges. We present our efforts for making our publications transparent and reproducible by accompanying them with the associated software, data and metadata. Concerning the software, our aim is to provide for each publication a containerized environment storing the complete software stack that is necessary to run the corresponding simulations. Concerning the research data, we present the workflow that is being developed currently within the SFB 1313 and the SimTech Cluster of Excellence, together with the university library and the computing centers in Stuttgart.

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 3

MS 9: Pore-scale modelling - Part 3
*Multipurpose room 1 - **Chairs:** Martin Blunt, James McClure*

9:20	[411] **Integrated simulation of Darcy and Stokes flow for porous rock by lattice Boltzmann method.** *Eomzi Yang; Dong Hun Kang; Tae Sup Yun*
9:38	[321] **(Nano)pore scale modeling: can we learn from molecular simulations?** *Guillaume Galliero; Hai Hoang; Dominique Legendre*
9:56	[341] **Gas Permeability in Micro/Nano-Porous Media: An extended Kozeny-Carman-Klinkenberg Model.** *Murat Barisik; Safa Sabet; Ali Beskok*
10:14	[709] **Confinement effects of gas flows in molecular-scale channels.** *Qiang Sheng; Matthew K. Borg; Minh Tuan Ho; Jun Li; Yonghao Zhang; Jason M. Reese*
10:32	[637] **Simulation of capillary-dominated three-phase flow experiments on 3-D bead packs.** *Johan Olav Helland; Helmer Andre Friis; Espen Jettestuen; Rebecca Lynn Paustian; Dorthe Wildenschild*

MS 6: Physics of multi-phase flow in diverse porous media - Part 3
*Auditorium 3A - **Chairs:** Chris MacMinn, Laurent Talon*

9:20	[372] **Wettability – Capillary Pressure Relationships in Ketton Rock: From Nano-Scale Fluid Films to Core-Scale.** *Maja Rucker; Willem-Bart Bartels; Tom Bultreys; Marijn Boone; Martin Blunt; Ove Wilson; Veerle Cnudde; Steffen Berg; Apostolos Georgiadis; Paul Luckham*
9:38	[400] **Wettability in porous rocks, from macroscopical measurements to pore scale characterization.** *Prisca Andriamananjaona; Manuel Chamerois; Peter Moonen; Richard Rivenq*
9:56	[449] **Role of the interaction of the calcite-water interface in the wettability alteration during low salinity waterflooding.** *Shuai Li; Matthew D. Jackson*
10:14	[208] **Pore scale observations of the impact of wettability alteration on fluid interfacial curvature.** *Qingyang Lin; Branko Bijeljic; Ronny Pini; Martin Blunt; Sam Krevor*

Oral presentations: Parallel sessions 3 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 3
*Auditorium 3B - **Chairs:** Inga Berre, Holger Steeb*

9:20	[211] **Hydraulic Fracturing In Layered Media: Comparison of Different Scenarios.** *Saeed Salimzadeh*
9:38	[752] **Permeability change during the growth of dense 3D geomechanical fracture networks.** *Robin N Thomas; Adriana Paluszny; Robert Zimmerman*
9:56	[128] **Numerical investigation of fracture propagation in porous medium under shear stimulation of fluid flow.** *Hau Trung Dang; Inga Berre; Eirik Keilegavlen*
10:14	[461] **Poroelastic coupling and rupture directivity in injection-induced earthquakes.** *Sandro Andres; David Santillan; Juan Carlos Mosquera; Luis Cueto-Felgueroso*
10:32	[689] **Shear and Tensile Failure Modeling in the Context of Embedded Discrete Fractures.** *Amir Ashrafi Habibabadi; Rajdeep Deb; Patrick Jenny*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 1
*Room 3 - **Chairs:** Marco Dentz, Branko Bijeljic*

9:20	[50] **Impact of image resolution on quantification of mineral properties and simulated mineral reactions and reaction rates.** *Lauren Beckingham; Fanqi Qin*
9:38	[398] **Probing small-scale connectivity for a high-permeability carbonate rock via two-phase tracer dispersion.** *Pierre M Adler; Igor Shikhov; Christoph Arns*
9:56	[794] **Coupled Impact of Physical and Chemical Heterogeneity on Reaction Rates and Dissolution Patterns in Mixed-Mineralogy Porous Rock.** *Yousef Al-khulaifi; Qingyang Lin; Martin Blunt; Branko Bijeljic*
10:14	[243] **Pore Scale Modelling of Reactive Transport in Porous Media: Implications to Geological Energy Applications.** *Hamidreza Erfani Gahrooei; Vahid. J. Niasar*
10:32	[248] **Magnetic resonance imaging to assess changes in transport properties of porous media due to dissolution and precipitation processes.** *Jenna Poonoosamy; Andreas Pohlmeier; Sabine Haber Pohlmeier; Martina Klinkenberg; Dirk Bosbach; Guido Deissmann*

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 3 *(cont.)*

MS 1: Porous Media for a Green World: Energy & Climate - Part 2
*Room 1 - **Chairs:** Rainer Helmig, Hadi Hajibeygi*

9:20	[89] **Beyond Kozeny Carman.** *Peter Knabner; Andreas Rupp; Nadja Ray; Raphael Schulz*
9:38	[423] **On the applicability of superposition principle to multiphase flow for the assessment of CO2 storage capacity.** *Silvia De Simone; Samuel Jackson; Robert Zimmerman; Sam Krevor*
9:56	[456] **The effect of carbonate cementation on the pore space structure.** *Andrzej Radlinski; Tomas Blach; Matej Lipar; Silvana Magni; Schweins Ralf; Hartmut Lemmel; Piotr Szymczak*
10:14	[855] **The role of convection for CO2 migration and trapping in CO2-EOR reservoirs.** *Sarah Gasda; Tor Harald Sandve; Roland Kaufmann; Robert Klofkorn; Ivar Aavatsmark*
10:32	[462] **The impact of small-scale rock heterogeneity on CO2 plume migration and residual trapping.** *Maartje Boon; Hailun Ni; Sally M. Benson*

MS 5: Biochemical processes and biofilms in porous media - Part 3
*Room 2 - **Chairs:** Leon van Paassen; Ebigbo Anozie*

9:20	[885] **In Situ Bioremediation of Selenium and Nitrate for Mine Waste Management in the Elk Valley, British Columbia.** *Brent Peyton; Lisa Kirk; Seth D'Imperio; Chiachi Hwang*
9:38	[568] **Improved understanding of microbe-mineral interactions using droplet-based microfluidics.** *Neerja Zambare; Robin Gerlach; Nada Naser; Connie Chang*
9:56	[656] **Experimental investigation of microbial induced calcium carbonate precipitation induced by Sporosarcina pasteurii on the microscale.** *Jennifer Zehner; Mohammad Amin Razbani; Simone Balzer Le; Alexander Wentzel; Espen Jettestuen; Anja Royne; Pawel Sikorski*
10:14	[664] **Biological activity affects rheological properties in surface water sediments.** *Florian Zander; Ahmad Shakeel; Alex Kirichek; Claire Chassagne; Julia Gebert*
10:32	[739] **Pore-scale Characterization of Biogenic Gas Formation in Porous Media: The Effect of Gas Production Rate.** *Daehyun Kim; Nariman Mahabadi; Jaewon Jang; Leon van Paassen*

Oral presentations: Parallel sessions 3 *(cont.)*

MS 12: Advances in mathematical modeling and numerical simulation of poromechanics - Part 1
Room 6 - **Chairs:** *Adrian Florin Radu, Joshua White*

9:20	[196] **Iterative coupling methods for multi-permeability poroelasticity models.** *Johannes Kraus; Qingguo Hong; Maria Lymbery; Mary Wheeler*
9:38	[278] **Multiscale and multiphysics models for geomechanics.** *Paolo Zunino; Daniele Cerroni; Luca Formaggia; Anna Scotti*
9:56	[257] **Robust Preconditioners for Mixed-dimemsional Models of Flow in Fractured Porous Media.** *Xiaozhe Hu; Wietse Boon; Ana Budisa*
10:14	[452] **Smart & cost efficient solvers for poroelastic wave propagation.** *Uwe Koecher; Markus Bause*
10:32	[262] **Numerical Simulation of Foam Three Phase Displacement Characteristics in porous media Using Stochastic Bubble Population Model.** *Dongxing Du; Yingge Li*

MS 17: Thermal Conductivity of Nanoscale and Microscale Porous Materials - Part 1
Room 8 - **Chairs:** *Guihua Tang, Hu Zhang*

9:20	[765] **Fluid flow and heat transfer modeling through metal foams or lamella structures.** *Farshid Jamshidi; Anastasia August; Andreas Reiter; Aron Kneer; Michael Selzer; Britta Nestler*
9:38	[125] **Thermal conductivity measurement of porous materials: challenges, examples and prospects.** *Hu Zhang; Shang Chen-Yang; Tang Gui-Hua*
9:56	[713] **Microscale modeling of high-temperature heat transfer in anisotropic porous materials.** *Federico Semeraro; Joseph Ferguson; Sadaf Sobhani; Arnaud Borner; Francesco Panerai; Nagi Mansour*
10:14	[141] **Numerical calculation of effective thermal conductivity for aerogel porous materials at high temperature.** *Yuan Ma; Tang Gui-Hua; Jiangfeng Guo; Yanjie Ma*
10:32	[53] **Effect of the rigidity of a granular material on heat transfer.** *Wenbin Fei; Guillermo Narsilio; Joost van der Linden; Mahdi Disfani*

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 4

MS 9: Pore-scale modelling - Part 4
*Multipurpose room 1 - **Chairs:** Martin Blunt, Stephane Zaleski*

11:20	[67] **A phase-field moving contact line model with soluble surfactants.** *Guangpu Zhu; Jun Yao*
11:38	[424] **Generalizing the Non-Local Darcy Formulation for Settings with Boundaries.** *Daniel Meyer; Artur Gomolinski*
11:56	[407] **Improving the description of two-phase flow in rocks by integrating pore scale models and experiments.** *Tom Bultreys; Kamaljit Singh; Ali Q. Raeini; Leonardo C. Ruspini; Paal-Eric Oren; Steffen Berg; Branko Bijeljic; Martin J. Blunt*
12:14	[472] **Constitutive relations for primary, secondary drainage and imbibition from percolation theory.** *Hamidreza Salimi; Karl-Heinz Wolf; Hans Bruining*
12:32	[480] **Pore Network Modeling of Mixed-Wet Carbonates Based on Pore Classification and Fluid Continuity.** *Asli S. Gundogar; Serhat Akin; Cynthia M. Ross; Anthony Kovscek*

MS 6: Physics of multi-phase flow in diverse porous media - Part 4
*Auditorium 3A - **Chairs:** Maja Ruecker, Esosa Eguagie*

11:20	[567] **The impact of the calcite surface charge on multicomponent transport in chalk aquifers.** *Maria Bonto; Ali Akbar Eftekhari; Hamid M. Nick*
11:38	[591] **Three-Phase Flow Visualization and Characterization for Water- and Mixed-Wet Carbonate Rocks.** *Alessio Scanziani; Kamaljit Singh; Amer Alhammadi; Hannah Menke; Branko Bijeljic; Martin Blunt*
11:56	[158] **Environmental Constraints of Non-Mechanical Excavation of Water from Gypsum on the Martian Surface.** *Shahab Bayani Ahangar; Ezequiel F. Medici; Paul J. van Susante; Timothy C. Eisele; Jeffrey S. Allen*
12:14	[861] **A numerical tool for design and explicit chemical interpretation of low salinity water flooding experiments.** *Kata Kurgyis; Holger Ott; Bernd Flemisch; Rainer Helmig; Johannes Hommel*
12:32	[503] **The role of chemical heterogeneities in controlling the wetting state of porous media.** *Gaetano Garfi; Cedric M. John; Sam Krevor*

Oral presentations: Parallel sessions 4 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 4
*Auditorium 3B - **Chairs:** Stefano Berrone, Hamid Nick*

11:20	[404] **A Lagrange multiplier method for single-phase flow in 3D discrete fractured porous media.** *Philipp Schadle; Patrick Zulian; Daniel Vogler; Maria G.C. Nestola; Anozie Ebigbo; Rolf Krause; Martin O. Saar*
11:38	[318] **Reduced Darcy-Stokes model for flow in fractured porous media.** *Iryna Rybak; Stefan Metzger*
11:56	[298] **Simulation of fluid flow in porous materials with embedded fractures via an optimization approach.** *Stefano Scialo; Stefano Berrone; Sandra Pieraccini*
12:14	[259] **What key physical factors yield a good horizontal hydrofractured gas well in a mudrock?** *Syed Haider; Tadeusz Patzek*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 2
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

11:20	[14] **Coupling free flow and porous-medium flow: Comparison of solution strategies for solving saddle-point problems.** *Melanie Lipp; Rainer Helmig; Martin Schneider; Bernd Flemisch*
11:38	[136] **Coupled 1D-3D Flow Models.** *Jan Martin Nordbotten; Kundan Kumar; Ingeborg Gaseby Gjerde*
11:56	[693] **A Conservative Streamline Method for In-Situ Combustion Processes.** *Luiz Sampaio; Margot Gerritsen; Anthony Kovscek*
12:14	[324] **Three-Phase Fractional-Flow Theory of Oil Displacement by Foam with Multiple Steady States.** *Jinyu Tang; P. Castañeda; D. Marchesin; William R. Rossen*
12:32	[812] **On the scalability of MGSR- and CWY-based GMRES variants for the solver of two-phase flow in porous media using MHFEM discretization.** *Jakub Klinkovsky; Radek Fucik; Tomas Oberhuber*

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 4 *(cont.)*

MS 1: Porous Media for a Green World: Energy & Climate- Part 3
*Room 1 - **Chairs:** Rainer Helmig, Hadi Hajibeygi*

11:20	[837] **Improved performance of geothermal systems through modelling with uncertainties.** *Denis Voskov; Daniilidis Alex*
11:38	[260] **Impacts of brine and reservoir properties on the transport of HPAM solutions in low permeability porous media.** *Imane Guetni; Claire Marliere; David Rousseau; Isabelle Bihannic; Manuel Pelletier; Frederic Villieras*
11:56	[711] **Creating synthetic porous media for multiphase flow experiments under controlled conditions.** *Swej Shah; Alexander van Ballaer; Amin Askarinejad; William R. Rossen; Karl-Heinz Wolf*
12:14	[355] **Finite element analysis of LTE and LTNE processes during steam injection process in porous media.** *Taofik Nassan; Mohammad Amro*
12:32	[725] **4D Structural and Chemical Characterization of Reactive Magnesium Cement-Based Concrete.** *Anna Herring; Mohammad Saadatfar; Fatin Mahdini; Penelope King; Ulrike Troitzsch*

MS 20: Biophysics of living porous media: theory, experiment, modeling and characterization - Part 1
*Room 2 - **Chairs:** Guiseppe Sciume, Luigi Preziosi*

11:20	[877] **Modelling cell migration in confined environemnts.** *Luigi Preziosi*
11:38	[417] **Viscoelastic multiphase flow simulations for tumor growth.** *Vincent le Maout; Giuseppe Sciume; Henri Bertin*
11:56	[459] **The significance of porous cell walls for water transport in plants.** *Steven Jansen; Cora Carmesin; Lucian Kaack; Zhang Ya; Schenk H. Jochen*
12:14	[286] **Comparing simple and complex continuum-mechanical models for lung-cancer proliferation.** *Patrick Schroder; Arndt Wagner; Wolfgang Ehlers*
12:32	[62] **Analyzing tissue remodeling in avascular tumors.** *Pietro Mascheroni*

Oral presentations: Parallel sessions 4 *(cont.)*

MS 16: Fluid Interactions with Thin Porous Media - Part 1
*Room 6 - **Chairs:** Philippe Coussot, Marc Prat*

11:20	[817] **Experimental and numerical study of the compression dependency of the permeability of nonwoven.** *Sarah Staub; Ralf Kirsch; Stefan Rief*
11:38	[148] **Effect of surfactants on film formation in inkjet printing on dense and porous media** *Gianmarco Venditti; Myroslava Hanyak; Anton Darhuber*
11:56	[253] **Water sorption into and evaporation from thin porous media - a thermographic study** *Vignesh Murali; J. C. H. Zeegers; Anton. A. Darhuber*
12:14	[874] **Dynamics of paper fiber during liquid imbibition; capillary pull and swelling** *Raoul Frijns; Joris Sprakel; Jasper van der Gucht*
12:32	[140] **The Effects of Coating Morphology on Complex Liquid – Porous Substrates Interaction** *Helder Salvador; Hamid Mansouri; Herman Wijshoff; Nicolae Tomozeiu*
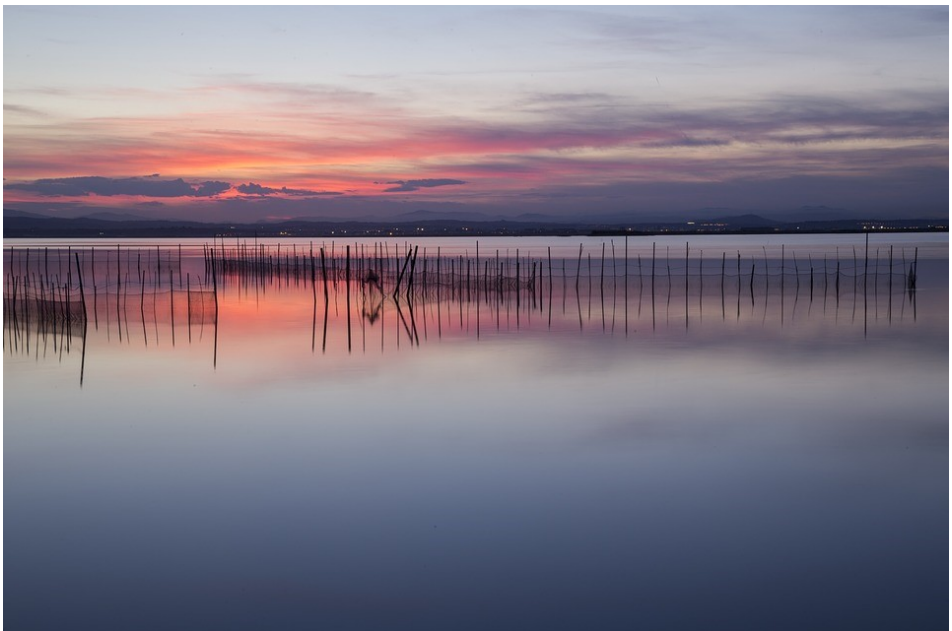
Must See sight: The Albufera Nature Park

TUESDAY, 7 MAY 2019

## Invited Speakers: Session 1

Prof. Daniel Bonn
University of Amsterdam
Auditorium 2 - 14:00
Chair: *Luis Cueto-Felgueroso*

Wet granular materials: from building sandcastles to the construction of the Egyptian pyramids.

I will discuss the rheology and mechanical properties of wet granular materials, and show why the behavior can be very subtle. Once one understands the mechanical properties, I will show that one can use this knowledge to construct the perfect sandcastle, or to understand why the ancient Egyptians wetted the desert sand with water before sliding heavy stones over it (Figure).

I will then go on to show some new results on friction at the microscopic scale, between 2 grains. Amonton's famous friction law states that the friction force is proportional to the normal force since both are proportional to the area of contact. However for spherical grains, the contact area is not proportional to the normal force, as shown by Hertz long ago. We use a new fluorescence technique that allows us to probe the real area of contact between 2 rough surfaces. In our case, we conclude that important deviations from Amonton's law are observed.
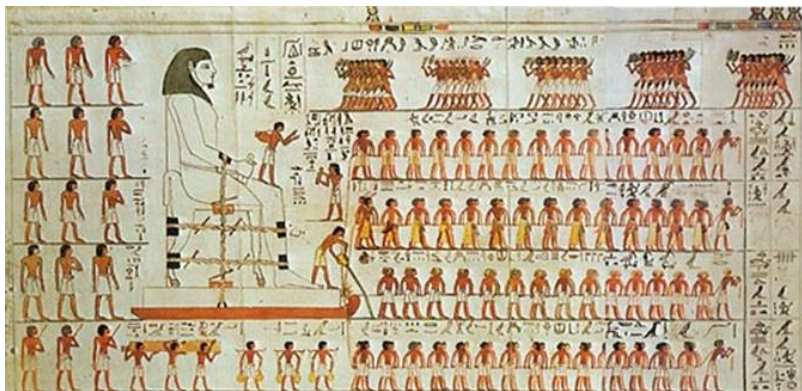
One of the mysteries of sand is why the Egyptians wetted the sand with water if they wanted heavy constructions to slide over it, as is shown explicitly in this wall painting of 1880 BC on the tomb of Tehuti-hetep (Fig.1(a)). Was this done to facilitate the sliding? According to archeologists, this is not the case: "Another figure standing from the base pours water from a jar in front of the sledge, perhaps only a ceremonial act, since even in large quantities water poured upon the ground could not assist the dragging."

Invited Speakers: Session 1 *(cont.)*

Dr. Joshua White

Atmospheric, Earth, and Energy Division
Lawrence Livermore National Laboratory
Auditorium 3A - 14:00
Chair: *Matthieu Vandamme*

Scalable Solvers for Multiphase Poromechanics

Many applications involving porous media—notably reservoir engineering and geologic applications—involve tight coupling between multiphase fluid flow, transport, and poromechanical deformation. While numerical models for these processes have become commonplace in research and industry, the poor scalability of existing solution algorithms has limited the size and resolution of models that may be practically solved. In this work, we propose a multistage Newton-Krylov solution algorithm to address this shortfall. The proposed solver exhibits rapid convergence, good parallel scalability, and is robust in the presence of highly heterogeneous material properties. The key to success of the solver is a block-preconditioning strategy that breaks the fully-coupled system of mass and momentum balance equations into simpler sub-problems that may be readily addressed using targeted algebraic methods. Numerical results are presented to illustrate the performance of the solver on challenging benchmark problems.
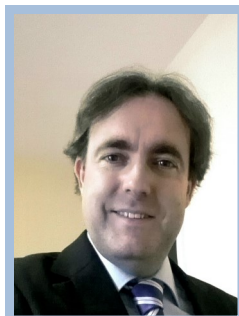

Must See sight: The City of Arts and Sciences

TUESDAY, 7 MAY 2019

Invited Speakers: Session 1*(cont.)*

Dr. Francisco Perez Reche
University of Aberdeen
Auditorium 3B - 14:00
Chair: *Majid Hassanizadeh*

Network models for physical and biological processes in porous media.

The structure of porous media can be remarkably complex and understanding how such complexity affects processes occurring in the porous space can be extremely challenging. In this talk, I will illustrate how modelling the pore space as a complex network can help understanding the effect of intricate structure on physical and biological processes in porous media. In particular, I will summarise our methods to investigate biological invasions in soil and capillary condensation in technologically important porous media. Or modelling of soil biological invasions is based on network representations of the pore space derived from 3D digital images of soil samples scanned with X-ray micro-tomography. Networks are then used as a substrate to describe the spread of generic microorganisms in terms of epidemic-like mathematical models which we studied through numerical simulations. We found that the remarkable structural heterogeneity of soil typically favours microbial invasions. The mechanisms behind this general observation are closely related to the topology of the pore space network. Our description of capillary condensation is also based on network models of porous media but condensation is described in terms of lattice gas models that can be mapped to spin models with heterogeneity. Such mapping allowed us to obtain exact solutions for relatively simple network topologies that are sufficient to explain important features of sorption-desorption curves at the macroscopic level.

Dr. Veronika Schleper

Robert Bosch GmbH
Room 3 - 14:00
Chair: *Julia Gebert*

The role of porous media in PEM fuel cells.

Polymer electrolyte membrane (PEM) fuel cells are one of the major technologies for electrified mobility. From a fluid dynamic perspective, fuel cells are a rather complicated multi-component multi-phase flow problem in a variety of thin porous layers, in general in thermal non-equilibrium. This leads to a variety of complex processes that interact and have to be described correctly in order to predict the behaviour of the fuel cell under operation.

In my talk, I will explain the role of the different layers of a PEM fuel cell and point our the major physical effects, that have to be taken into account. The intention is to give an overview of the technology for those participants that are not so familiar with fuel cells, but would like to know more and maybe start their own research in the field of fuel cells.

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 5

MS 9: Pore-scale modelling - Part 5
*Multipurpose room 1 - **Chairs:** Stephane Zaleski, James McClure*

14:35	[702] **Multiscale, pore-scale modeling of fluid mechanics using digital images and direct numerical solutions on unstructured meshes.** *Karsten Thompson; Paula C. Sanematsu*
14:53	[750] **A comparison between 2D, quasi-3D and fully-3D phase-field simulations of two-phase displacements at the pore scale** *Luis Cueto-Felgueroso; Amir Pahlavan; Robin Zhao; Ruben Juanes*
15:11	[753] **Impact of Time-dependent wettability alteration on Capillary pressure.** *Abay Kassa; Sarah Gasda; Kundan Kumar; Florin Radu*
15:29	[781] **Modelling immiscible fingering in hierarchically structured porous media.** *Yixiang Gan*
15:47	[788] **Pore network modeling in unsaturated soil mechanics: current state, challenges, and future perspectives.** *Ehsan Nikooee; Ghassem Habibagahi; Rasoul Mirghafari; S. Sajjad Sajjadian; Thomas Sweijen*

MS 6: Physics of multi-phase flow in diverse porous media - Part 5
*Auditorium 3A - **Chairs:** Qingyang Lin, Ying Gao*

14:35	[76] **On the wettability of porous systems.** *Ryan Armstrong; Chenhao Sun; James McClure; Anna Herring; Peyman Mostaghimi; Steffen Berg*
14:53	[565] **Observation and modelling of capillary instabilities, front pinning and drainage/imbibition hysteresis in two-phase displacements across a single constriction.** *Jordi Ortin; Ramon Planet; Lautaro Diaz-Piola*
15:11	[267] **Free Energy of Immiscible Two-Fluid Flow in Porous Media by Integral Geometry and Thermodynamics.** *Hamid Hosseinzade Khanamiri; Carl Fredrik Berg; Per Arne Slotte; Steffen Schluter; Ole Torsaeter*
15:29	[734] **Time-Correlation Functions of Immiscible Two-Phase Flow in Porous Media.** *Mathias Winkler; Magnus Aashammer Gjennestad; Dick D. Bedeaux; Raffaela Cabriolu; Signe Kjelstrup; Alex Hansen*
15:47	[759] **Hysteresis of Multiphase Flow in Porous and Fractured Media.** *Ran Holtzman; Marco Dentz; Ramon Planet; Jordi Ortin*

Oral presentations: Parallel sessions 5 *(cont.)*

MS 22 - Special MS for Prof. Bernhard A. Schrefler
*Auditorium 3B - **Chair:** Lorenzo Sanavia*

14:35	[784] **Modelling chemical deterioration processes in building materials - Poromechanical approach.** *Dariusz Gawin; Marcin Koniorczyk; Francesco Pesavento*
14:53	[879] **Beyond failure of geomaterials.** *Manuel Pastor; Diego Guillermo Manzanal; Miguel Martin Stickle; P. Navas; Agustin Yague; Saeed S.M. Tayyebi ; M. Molinos; J.A.Fernandez Merodo; Pablo Mira Mc Williams*
15:11	[876] **Effective Stress and Energetics of Unsaturated Soils.** *Nasser Khalili*
15:29	[808] **Micromorphic contributions to granular and porous materials.** *Wolfgang Ehlers; Sami Bidier*
15:47	[863] **Phase-field modelling of desiccation cracks in multiphase porous media.** *Tuanny Cajuhi; Claudio Gavagnin; Laura De Lorenzis; Lorenzo Sanavia*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 3
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

14:35	[30] **Nonlinear upscaling for flows in porous and fracture media.** *Eric Chung; Maria Vasilyeva*
14:53	[182] **Multiscale numerical simulation and analysis on reactive acid flow in carbonate rock.** *Cunqi Jia; Jun Yao*
15:11	[316] **An upscaled model for the transport of inertial particles in a water-saturated porous medium.** *Max Endo Kokubun; Florin Adrian Radu; Eirik Keilegavlen; Kundan Kumar; Kristine Spildo*
15:29	[367] **Mathematical Modeling and Simulation of Asphaltene Precipitation and Deposition during Miscible Displacement of Fluids in Porous Media.** *Nasser Sabet; Hassan Hassanzadeh; Jalal Abedi*
15:47	[357] **Novel approaches for upscaling transport beyond homogenisation.** *Matteo Icardi; Thomas Hudon; Simona Perotto; Giovanni Porta*

TUESDAY, 7 MAY 2019

Oral presentations: Parallel sessions 5 *(cont.)*

MS 1: Porous Media for a Green World: Energy & Climate - Part 4
*Room 1 - **Chairs:** Rainer Helmig, Hadi Hajibeygi*

14:35	[277] **Structural changes in bulk materials for thermochemical energy storage.** *Marie Gollsch; Matthias Bisdorf; Marc Linder*
14:53	[901] **Coupled Thermally-Enhanced Bioremediation and Renewable Energy Storage System: Conceptual Framework and Modeling Investigation.** *Kathleen Smits; Ali Moradi*
15:11	[84] **Low-Temperature Waste Heat Recovery by Reverse Electrodialysis Cells.** *Kim Roger Kristiansen; V. Maria Barragan; Signe Kjelstrup*
15:29	[780] **Fundamentals of Geometrical and Physical Concept of Pore Space Tortuosity.** *Mieczyslaw Cieszko*
15:47	[541] **Why permeability reduction during carbon geosequestration in coal seam: an experimental study via direct in-situ microCT scanning.** *Yihuai Zhang; Stefan Iglauer; Maxim Lebedev*

MS 20: Biophysics of living porous media: theory, experiment, modeling and characterization - Part 2
*Room 2 - **Chairs:** Guiseppe Sciume, Luigi Preziosi*

14:35	[763] **Predicting diameter changes of the vasculature to regulate blood flow during activation.** *Robert Epp; Franca Schmid; Bruno Weber; Patrick Jenny*
14:53	[352] **Mathematical Models for Skin Penetration.** *Arne Naegel*
15:11	[43] **A multi-scale asymptotic homogenization technique to the material remodeling of heterogeneous media.** *Ariel Ramirez-Torres; Salvatore Di Stefano; Alfio Grillo; Reinaldo Rodriguez-Ramos; Jose Merodio; Raimondo Penta*
15:29	[351] **Homogenized modeling for vascularized poroelastic materials.** *Raimondo Penta; Jose Merodio*
15:47	[828] **Validation of functional-structural root system models using MRI-monitored tracer experiments.** *Jan Vanderborght; Axelle Koch; Felicien Meunier; Sarah Garre; Andreas Pohlmeier; Mathieu Javaux*

Oral presentations: Parallel sessions 5 *(cont.)*

MS 16: Fluid Interactions with Thin Porous Media - Part 2
*Room 6 - **Chairs:** Marc Prat, Nicolae Tomozeiu*

14:35	[268] **Homogeneous wetting by controlled imbibition.** *Mohamed Nidal Ben Abdelouahab; Philippe Coussot; Alban Gossard*
14:53	[429] **Fluid flow in a channel partially filled with thin ordered porous media: pore scale simulations vs volume averaging continuum modeling.** *Nima Fallahjoybari; Staffan Lundstrom; Majid Eshagh Nimvari*
15:11	[700] **Characterization of pore interconnectivity and adsorption-induced deformation in mesoporous thin films by ellipsometry porosimetry : an experimental study.** *Jerome Loizillon; David Grosso*
15:29	[647] **Two-scale approach for the simulation of fluid-structure interaction in thin fibrous filters.** *Sarah Staub; Heiko Andra; Julia Orlik; Ralf Kirsch; Stefan Rief*
15:47	[263] **Mesoscopic modelling of ink imbibition in paper.** *Thejas Hulikal Chakrapani; Stefan Luding; Wouter K. den Otter*

MS 10: Advances in imaging porous media: techniques, software and case studies - Part 3
*Room 8 - **Chairs:** Melanie Britton, Veerle Cnudde*

14:35	[512] **Dynamic X-ray Tomography in the Laboratory: Exploring foam stability in 4D.** *Jan Dewanckele; Marijn Boone; Arno Merkle*
14:53	[864] **10 Hz Operando X-ray Tomographic Imaging of Liquid Water in Gas Diffusion Layers of Polymer Electrolyte Fuel Cells.** *Hong Xu; Minna Buher; Federica Marone; Thomas J. Schmidt; Felix N. Buchi; Jens Eller*
15:11	[832] **Initiation and propagation of strain localization in cohesive soil using a novel miniature triaxial cell and X-ray Computed Tomography.** *Christopher Ibeh; Matteo Pedrotti; Alessandro Tarantino; Rebecca J. Lunn*
15:29	[543] **Correlation of magnetic resonance imaging and High-Resolution X-ray Tomography to characterise pore size distributions in polymeric open – cell sponges.** *Gabriele M. Cimmarusti; Abhishek Shastry; Matthieu N. Boone; Kostas Gkatzionis; Melanie M. Britton*

TUESDAY, 7 MAY 2019

3-minute pitch presentations: Parallel sessions 1

*Multipurpose room 1 - **Chairs:** Jan Vanderborght, Ioannis Zarikos*

16:10 [137] **New Yield Stress fluid porosimetry Method (YSM).**
Terence Emery Mackaya

16:13 [205] **Introducing a New Conceptual-Physical Model for Simulation of Groundwater Flow in a Porous Medium Using a Network of Pipes.**
Hamed Tavakolipour

16:16 [273] **Pushing of a liquid drop through a non-wettable porous media.**
Maciej Matyka

16:19 [147] **Wicking simulations of cryogenic liquid into superheated porous structures.**
Dawid Zimnik

16:22 [526] **Influence of sub-micrometer porosity on permeability of Rotliegend reservoir sandstones.**
Markus Peltz

16:25 [558] **Numerical challenges in modelling spontaneous imbibition flows in throat-pore body systems: an assessment of the volume of fluid formulations.**
Florian Doster

16:28 [627] **Pore-scale investigation of Bingham fluids flow through tight sandstone on representative element volume.**
Tong Liu

16:31 [691] **Assessing pore network model performance for predicting flow and transport in three dimensional porous media.**
Quirine Krol

16:34 [925] **The Effect of Injection Rate on Fluid Invasion Patterns: Immiscible Two-Phase Fluid Displacement in 2D Laser-Manufactured Micromodels.**
Rumbidzai A. E. Nhunduru

16:37 [909] **Numerical study of dispersed foamer injection in a gas stream for Enhanced Oil Recovery in Naturally Fractured Reservoirs.**
Juan Mejia

16:40 [967] **Investigating the enhanced mass flow rates in pressure-driven water flow through nanopores.**
Alexandros Stamatiou

3-minute pitch presentations: Parallel sessions 1 *(cont.)*

*Auditorium 3A - **Chairs:** Daniel Meyer; Eshan Eftekhari*

16:10   [167] **Structural adaptation of biological tissues**
Salvatore Di Stefano

16:13   [334] **Hepatitis C virus replication within the porous medium of the Endoplasmatic Reticulum.**
Markus Knodel

16:16   [362] **Molecular Dynamics Simulations of Polymeric Fibre Bundles under Tensile Load.**
Eivind Bering

16:19   [550] **Mechanics of Reactive Porous Medium Systems: a powerful tool for modeling driving forces in cancer cells invasion and metastasis.**
Giuseppe Sciume

16:22   [807] **Role of Surface Area Density of Porous Paper-like Materials on the Detection Performance of Lateral Flow Assay.**
Shangsheng Feng

16:25   [26] **Investigation of time dependent liquid property influence on paper wetting and penetration using pico-liter contact angle measurement.**
Sarah Krainer

16:28   [165] **Insights into the physical interactions of water based ink with porous paper.**
Nicolae Tomozeiu

16:31   [317] **Watching ink dry.**
Riccardo Antonelli

16:34   [435] **Using direct numerical simulations to uncover the mechanisms of two-phase flow between GDL interfaces in fuel cells.**
Daniel Niblett

16:37   [642] ***Cancelled***

16:40   [911] **Estimation of permeability reduction during drilling operations in naturally fractured reservoirs.**
Kelly Lorena Diez Hernandez

16:43   [908] **The Soil-Atmosphere Interface: Numerical Analysis of Coupled Free-flow Porous Media Flow Systems.**
Edward Coltman

TUESDAY, 7 MAY 2019

3-minute pitch presentations: Parallel sessions 1 *(cont.)*

*Auditorium 3A (cont.) - **Chairs:** Daniel Meyer; Eshan Eftekhari*

16:46 [454] **Numerical modeling of thin porous media with LBM.**
Tobias Forslund

16:49 [87] **Natural designs of efficient heat and mass exchangers.**
Solberg Simon B. b.

16:52 [744] **Depth-dependent Flow and Pressure Characteristics in Brain Microvascular Networks.**
Franca Schmid; Bruno Weber; Patrick Jenny

16:55 [94] **Biofilms in porous media: laboratory experiments, mathematical modelling, and upscaling.**
David Landa Marban

*Auditorium 3B - **Chairs:** Seonkyoo Yoon, Masoud Babaei*

16:10 [85] **Atomic Force Microscopy (AFM) Study of Wettability Modification and Mineralogy of Bandera Brown.**
Sherifat Yesufu

16:13 [166] **Uranium release and migration in porous rock under geologic CO_2 storage conditions: a numerical investigation.**
Liwei Zhang

16:16 [339] **Multi-scale Extended Finite Element Method For Fractured Geological Formations.**
Fanxiang Xu

16:19 [466] **Nonisothermal modeling of CO_2 dissolution trapping in deep saline aquifers.**
Mrityunjay Singh

16:22 [469] **Model coupling in thermochemical heat storage.**
Rainer Helmig

16:25 [894] **Genetic Mechanism of Diverse Pores in Bioclastic Limestone and Impacts on Reservoir Quality.**
Fengfeng Li

16:28 [954] **Object-based modeling of braided river reservoir interbed constrained by genetic density.**
Siyang Li

16:31 [127] **Fourier-Transform Laser Speckle Imaging for fast, quantitative and real-time flow imaging.**
Jesse Buijs

16:34 [247] **Comparative study of voids in minerals aggregates of virtual aggregate assembly using a game physics' engine.**
Sonia Michot Roberto

3-minute pitch presentations: Parallel sessions 1 *(cont.)*

*Auditorium 3B (cont.) - **Chairs:** Seonkyoo Yoon, Masoud Babaei*

16:37   [511] **Impact of mixing dynamics on fluid-solid reactions in porous media: pore-scale imaging and modelling.**
Hojjat Borhany

16:40   [539] **Magnetic resonance imaging of freezing and thawing of water in two contrasting porous media.**
Michal Snehota

16:43   [562] **Bimodal imaging of water flow in samples of green infrastructure soils.**
Petra Heckova

16:46   [617] **Advanced X-ray Computed Tomography in Additive Manufacturing.**
Gerhard Zacher

16:49   [625] **In-Situ High Resolution Dynamic X-ray Microtomographic Imaging of Olive Oil Removal in Kitchen Sponges by Squeezing and Rinsing.**
Abhishek Shastry

16:52   [607] **Porosity of Pervious Concretes Based on 2D scan images.**
Jaehun Ahn

16:55   [150] **Pore-scale direct numerical simulations of non-continuum flows by solving kinetic model equations in OpenFOAM.**
Lianhua Zhu

*Room 3 - **Chairs:** Hideharu Yonebayashi; Wietse Boon*

16:19   [410] **Dust suppression by enzyme induced carbonate precipitation (EICP) in soils.**
Tae Sup Yun

16:22   [437] **Experimental observations of Sporosarcina Pasteurii attachment in sands and soils for a range of MICP treatment strategies.**
James Minto

16:25   [551] **Numerical simulations of underground carbon dioxide storage with hydrogen impurities.**
Joan Delort Ylla

16:28   [24] **Size effects of molecular sub-region in a multiscale, multiphase process.**
Fanli Liu

16:31   [504] **Solute transport for non-Darcy flow in porous media using pore network modelling.**
Amr El-Zehairy

16:34   [912] **Modelling of nanochannels imbibition with Smoothed Particles Hydrodynamics method.**
Magdalena Dymitrowska

Tuesday Detailed Program

TUESDAY, 7 MAY 2019

3-minute pitch presentations: Parallel sessions 1 *(cont.)*

*Room 3 (cont.) - **Chairs:** Hideharu Yonebayashi; Wietse Boon*

16:37	[385] **Rock-typing of heterogeneous rock samples via Minkowski functionals and hydraulic attributes.** *Han Jiang*
16:40	[696] **Lattice-Boltzmann modeling of osmosis during low-salinity flooding.** *Mohammad Golestan*
16:43	[841] **Assessment of the Low-Re RANS based turbulence models in two simplified pore geometries.** *Alejandro Alonzo-Garcia*
16:46	[984] **Geometrical 2D to 3D Transform.** *Juan Pablo Daza*
16:49	[966] **Representative Elementary Volume using Second-order Grayscale Entropy: A Sandstone and Carbonate case study.** *Ankita Singh*
16:52	[49] **Snap-Off Phenomenon in a Pore Network Model For Retrograde Gas Flow in Porous Media.** *Paula Reis*
16:55	[927] **Heavy oil recovery and asphaltenes deposition mechanism in solvent based recovery technique.** *Xuesong Li*

Must See sight: The City of Arts and Sciences

Poster board	Exhibition Hall
1	[989] **Combusting in the Deep. with a wee challenge to you.** *Margot Gerritsen*
2	[986] **Integrating publication, software and data in simulation sciences.** *Bernd Flemisch*
3	[40] **Experiment based pore network study on secondary capillary transport through liquid films of different morphology.** *Nicole Vorhauer; Yi Ding; Helmut Geistlinger; Evangelos Tsotsas; Marc Prat*
4	[71] **Study on modification experiment of pore structure of coal by response surface optimization method.** *Xiangfeng Liu*
5	[72] **Experimental Study on the Variation of Micro structure of Coal under surfactant.** *Laigui Wang; Wenbo An*
6	[119] **Simulation and Experimental Measurements of Internal Magnetic Field Gradients and NMR Transverse Relaxation Times (T2) in Sandstone Rocks.** *Paul Connolly; Weichao Yan; Mohammed Mahmoud; Eric May; Michael Johns*
7	[137] **New Yield Stress fluid porosimetry Method (YSM).** *Terence Emery Mackaya; Azita Ahmadi; Abdelaziz Omari*
8	[173] **Seepage characteristics and fracture numerical experiments on the action of stress-seepage coupling of the rock with micro random fractures.** *Na Zhao; Lai-gui Wang*
9	[205] **Introducing a New Conceptual-Physical Model for Simulation of Groundwater Flow in a Porous Medium Using a Network of Pipes.** *Parjang Monajemi; Hamed Tavakolipour*
10	[239] **Lattice Boltzmann Method for effective diffusion coefficient computation at the pore scale.** *Alain Genty*
11	[246] **GPU-based pore-scale transport modelling in heterogeneous rocks.** *Senyou An; Vahid.J Niasar*
12	[273] **Pushing of a liquid drop through a non-wettable porous media.** *Maciej Matyka*
13	[300] **Thermodynamic modeling of adsorption kinetics.** *Zaineb Zaafouri; Daniela Bauer; Guillaume Batot ; Carlos Nietos Draghi; Benoit Coasne*
14	[147] **Wicking simulations of cryogenic liquid into superheated porous structures.** *Dawid Zimnik*

TUESDAY, 7 MAY 2019

Poster exhibition: Session 1

Poster board	Exhibition Hall
15	[495] **Lattice Boltzmann simulation of drop impact on textile materials placed on a substrate.** *Ali Mazloomi Moqaddam; Thijs de Goede; Dominique Derome; Noushine Shahidzadeh; Daniel Bonn; Jan Carmeliet*
16	[526] **Influence of sub-micrometer porosity on permeabilty of Rotliegend reservoir sandstones.** *Markus Peltz; Arne Jacob; Sina Hale; Frieder Enzmann; Philipp Blum; Laurence Noel Warr; Georg Heinrich Grathoff*
17	[558] **Numerical challenges in modelling spontaneous imbibition flows in throat-pore body systems: an assessment of the volume of fluid formulations.** *Saideep Pavuluri; Julien Maes; Florian Doster*
18	[627] **Pore-scale investigation of Bingham fluids flow through tight sandstone on representative element volume.** *Tong Liu; Moran Wang*
19	[691] **Assessing pore network model performance for predicting flow and transport in three dimensional porous media.** *Quirine Krol; Itzhak Fouxon; Pascal Corso; Markus Holzner*
20	[696] **Lattice-Boltzmann modeling of osmosis during low-salinity flooding.** *Mohammad Golestan; Olav Aursjo; Berg Carl Fredrik; Eirik Flekkoy; Espen Jettestuen*
21	[701] **Pore-scale simulation of interphase mass transfer across fluids interfaces using the Phase-field method.** *Farzad Basirat; Auli Niemi*
22	[727] **Modelling of the liquid water transport in the porous layers of a PEM fuel cell using pore-network modelling techniques.** *Cynthia Michalkowski; Veronika Schleper; Rainer Helmig*
23	[762] **Impact of spatial correlations in particle sizes on fluid displacement in porous media.** *Oshri Borgman; Thomas Darwent; Enrico Segre; Lucas Goehring; Ran Holtzman*
24	[782] **Limit Models of Pore Space Structure of Porous Materials for Determination of Limit Pore Size Distributions Based on Mercury Intrusion Data.** *Mieczyslaw Cieszko; Marcin Kempinski; Tomasz Czerwinski*
25	[841] **Assessment of the Low-Re RANS based turbulence models in two simplified pore geometries.** *Alejandro Alonzo-Garcia; Ana Teresa Mendoza-Rosas; Martin Diaz-Viera; Edgar G. Martinez-Mendoza*

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
26	[984] **Geometrical 2D to 3D Transform.** *Juan Pablo Daza*
27	[957] **Pore scale mechanisms of chaotic advection.** *Joris Heyman; Daniel Lester; Yves Meheust; Tanguy Le Borgne*
28	[966] **Representative Elementary Volume using Second-order Grayscale Entropy: A Sandstone and Carbonate case study.** *Ankita Singh; Klaus Regenauer-Lieb; Ryan Armstrong; Peyman Mostaghimi*
29	[26] **Investigation of time dependent liquid property influence on paper wetting and penetration using pico-liter contact angle measurement.** *Sarah Krainer; Ulrich Hirn*
30	[42] **Pore network analysis of the steady state water saturation of hydrophilic GDLs at high current densities.** *Nicole Vorhauer; Haashir Altaf; Tanja Vidakovic-Koch; Evangelos Tsotsas*
31	[165] **Insights into the physical interactions of water based ink with porous paper.** *Nicolae Tomozeiu*
32	[167] **Structural adaptation of biological tissues.** *Salvatore Di Stefano; Kotaybah Haslamoun; Salvatore Federico; Alfio Grillo*
33	[317] **Watching ink dry.** *Riccardo Antonelli; Joris Sprakel; Jasper van der Gucht*
34	[334] **Hepatitis C virus replication within the porous medium of the Endoplasmatic Reticulum.** *Markus Knodel; Paul Targett-Adams; Alfio Grillo; Eva Herrmann; Gabriel Wittum*
35	[362] **Molecular Dynamics Simulations of Polymeric Fibre Bundles under Tensile Load.** *Eivind Bering; Signe Kjelstrup; Dick Bedeaux; Astrid Wijn*
36	[435] **Using direct numerical simulations to uncover the mechanisms of two-phase flow between GDL interfaces in fuel cells.** *Daniel Niblett; Vahid.J Niasar; Stuart Holmes*
37	[550] **Mechanics of Reactive Porous Medium Systems: a powerful tool for modeling driving forces in cancer cells invasion and metastasis.** *Giuseppe Sciume*
38	[641] **Modelling blood flow in mouse brain microvascular networks.** *Florian Goirand; Maxime Berg; Tanguy Le Borgne; Sylvie Lorthois*
39	[642] ***Cancelled***

Tuesday Detailed Program

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
40	[807] **Role of Surface Area Density of Porous Paper-like Materials on the Detection Performance of Lateral Flow Assay.** *Shangsheng Feng*
41	[906] **Fracture width prediction and particle size distribution design to wellbore strengthening: A comprehensive workflow for effective operations.** *Kelly Lorena Diez Hernandez; Carlos Nunez Perez; Juan Mejia; Juan David Valencia Londono*
42	[908] **The Soil-Atmosphere Interface: Numerical Analysis of Coupled Free-flow Porous Media Flow Systems.** *Edward Coltman; Andrea Vescovini; Thomas Fetzer; Rainer Helmig*
43	[80] **Discrete-continuum multiscale model for evolving porous media.** *Nadja Ray; Andreas Rupp; Alexander Prechtel*
44	[116] **Modeling a large scale experiment in MICP using independently determined parameters.** *Mohamed Nassar; Deviyani Gurung; Timothy Ginn; Michael Gomez; Charles Graddy; Doug Nelson; Jason DeJong*
45	[127] **Fourier-Transform Laser Speckle Imaging for fast, quantitative and real-time flow imaging.** *Jesse Buijs; Jasper van der Gucht; Joris Sprakel*
46	[166] **Uranium release and migration in porous rock under geologic CO2 storage conditions: a numerical investigation.** *Liwei Zhang; Xiuxiu Miao; Yan Wang; Manguang Gan; Hejuan Liu; Xiaochun Li*
47	[187] **Applying low-field nuclear magnetic resonance for characterization of nanoparticle transport through low permeability heterogeneous geomaterials.** *Yanhui Dong; Qian Zhang*
48	[245] **Reactive Density-Driven CO2 Mixing in Sandstone Aquifers: Role of Geochemistry.** *Hamidreza Erfani Gahrooei; Vahid.J Niasar; Masoud Babaei*
49	[247] **Comparative study of voids in minerals aggregates of virtual aggregate assembly using a game physics' engine.** *Sonia Michot Roberto; Alvaro Garcia Hernandez; Andrew Dawson*
50	[258] **Precipitation characteristics of enzyme-induced calcite – Experimental study using microfluidic chip.** *Raul Batista Araujo de Sousa; Jaewon Jang*

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
51	[339] **Multi-scale Extended Finite Element Method For Fractured Geological Formations.** *Fanxiang Xu; Hadi Hajibeygi; Bert Sluys*
52	[419] **Experimental study of biogenic gas bubble formation – Microfluidic chip and core-scale experiment.** *Juhee Han; Jaewon Jang*
53	[437] **Experimental observations of Sporosarcina Pasteurii attachment in sands and soils for a range of MICP treatment strategies.** *James Minto; Rebecca Lunn; Grainne El Mountassir*
54	[466] **Nonisothermal modeling of CO_2 dissolution trapping in deep saline aquifers.** *Mrityunjay Singh; Abhijit Chaudhuri; Philip Stauffer; Rajesh Pawar*
55	[494] **Variable Permeability and Reactions in a Hele-Shaw Cell model system of Carbon Dioxide Convective Dissolution for CCS.** *Delora Gaskins; Dehaeck Sam; Anne De Wit*
56	[511] **Impact of mixing dynamics on fluid-solid reactions in porous media: pore-scale imaging and modelling.** *Hojjat Borhany; Joris Heyman; Khalil Hanna; Tanguy Le Borgne*
57	[539] **Magnetic resonance imaging of freezing and thawing of water in two contrasting porous media.** *Michal Snehota; Andreas Pohlmeier; John Koestel; Tomas Princ; Martina Sobotkova; Milena Cislerova*
58	[551] **Numerical simulations of underground carbon dioxide storage with hydrogen impurities.** *Anwar Al Assadi; Joan Delort Ylla; Beatrix Becker; Allan Leal; Holger Class; Martin O. Saar; Anozie Ebigbo*
59	[562] **Bimodal imaging of water flow in samples of green infrastructure soils.** *Petra Heckova; Jitka Hanzlikova; Michal Snehota; Anders Kaestner; John Koestel*
60	[597] **Liquefaction mitigation of Fraser River sand with Microbial Induced Desaturation and Precipitation (MIDP).** *Liya Wang; Leon van Paassen*
61	[617] **Advanced X-ray Computed Tomography in Additive Manufacturing.** *Gerhard Zacher*
62	[623] **Numerical characterization of intrinsic permeability based on 2D and 3D data.** *Samaneh Vahid Dastjerdi; Maria Osorno; Nikolaos Karadimitriou; Holger Steeb*

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
63	[625] **In-Situ High Resolution Dynamic X-ray Microtomographic Imaging of Olive Oil Removal in Kitchen Sponges by Squeezing and Rinsing.** *Abhishek Shastry; Paolo E Palacio-Mancheno; Karl Braeckman; Ivan Josipovic; Sander Vanheule; Frederic Van Assche; Eric Robles; Veerle Cnudde; Luc Van Hoorebeke; Matthieu N. Boone*
64	[640] **Gas bubble migration and trapping in porous media – Pore-scale simulation.** *Nariman Mahabadi; Xianglei Zheng; Tae Sup Yun; Leon van Paassen; Jaewon Jang*
65	[873] **Non-isothermal Reservoir Souring Simulations.** *Moein Jahanbani Veshareh; H. M. Nick*
66	[951] **Structural characterization of nanoporous materials by small-angle X-ray scattering.** *Heiner Santner*
67	[602] **Quantifying Uncertainty Reduction in Geological CO_2 Sequestration.** *Bailian Chen; Dylan Harp; Shaoping Chu; Nataliia Makedonska; Rajesh Pawar*
68	[502] **A pore-scale model of microbially induced calcium carbonate precipitation.** *Mohammad Amin Razbani; Jennifer Zehner; Espen Jettestuen; Anja Royne; Pawel Sikorski; Anders Malthe-Sørenssen*
69	[607] **Porosity of Pervious Concretes Based on 2D scan images.** *Jaehun Ahn; Aryssa Kathreen Marcaida; Seongwoo Lee; Jongwon Jung*
70	[890] **Some improvements to projection-based embedded discrete fracture model (pEDFM).** *Xiang Rao; Linsong Cheng; Renyi Cao*
71	[469] **Model coupling in thermochemical heat storage.** *Gabriele Seitz; Holger Class; Rainer Helmig*
72	[897] **Boundary layers at "fluid - porous medium" interface.** *Kirill Tsiberkin; Irina Tyulkina*
73	[907] **Effect of cyclic injection on migration and trapping mechanisms of immiscible fluids in porous media.** *Sookyun Wang; Minhee Lee; Jung Gi Um; Seon-ok Kim*
74	[911] **Estimation of permeability reduction during drilling operations in naturally fractured reservoirs.** *Kelly Lorena Diez Hernandez; Nicolas Bueno Zapata; Juan Mejia; Juan D Vallejo*

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
75	[912] **Modelling of nanochannels imbibition with Smoothed Particles Hydrodynamics method.** *Magdalena Dymitrowska; Aliaksei Pazdniakou*
76	[915] **Research on water and rock interaction of groundwater contamination in abandoned coal mine.** *Xilin Li; Laigui Wang; Ling Liu; Xiangfeng Liu*
77	[918] **Dynamics of water imbibition through paper.** *Sooyoung Chang; Wonjung Kim*
78	[924] **Specific Surface Area Determination on Chalk Drill Cuttings.** *Dirk Muter; Stefan Bruns; Henning O. Sorensen*
79	[935] **Multiphase Flow Simulations in Large Domains of Upper Maastrichtian Chalk.** *Stefan Bruns; Henning O. Sorensen*
80	[936] **Pore-network - lattice Boltzmann method hybrid model for multiphase flow.** *Eduard Puig Montella; Bruno Chareyre; Antonio Gens*
81	[49] **Snap-Off Phenomenon in a Pore Network Model For Retrograde Gas Flow in Porous Media.** *Paula Reis, Marcio Carvalho*
82	[85] **Atomic Force Microscopy (AFM) Study of Wettability Modification and Mineralogy of Bandera Brown.** *Sherifat Yesufu; Maja Ruecker; Fons Marcelis; Paul Luckham*
83	[24] **Size effects of molecular sub-region in a multiscale, multiphase process.** *Fanli Liu, Wang Moran*
84	[925] **The Effect of Injection Rate on Fluid Invasion Patterns: Immiscible Two-Phase Fluid Displacement in 2D Laser-Manufactured Micromodels.** *Rumbidzai A. E. Nhunduru; Amir Jahanbakhsh; Omid Shahrokhi; Krystian L. Wlodarczyk; Duncan P. Hand; William N. MacPherson; Susana Garcia; M. Mercedes Maroto-Valer*
85	[909] **Numerical study of dispersed foamer injection in a gas stream for Enhanced Oil Recovery in Naturally Fractured Reservoirs.** *Hilmert Solano; Juan David Valencia Londono; Alonso Ocampo; Juan Mejia*
86	[910] **Dependency of stress regime and orientation on fracture permeability in naturally fractured reservoirs - a discrete fracture approach.** *Alejandro Restrepo; Lorena Diez; Juan D Vallejo; Juan Mejia*
87	[967] **Investigating the enhanced mass flow rates in pressure-driven water flow through nanopores.** *Alexandros Stamatiou; Kokou Dadzie*

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall

88 — [504] **Solute transport for non-Darcy flow in porous media using pore network modelling.**
Amr El-Zehairy; Mohaddeseh Mousavi Nezhad; Vahid.J Niasar; Ian Guymer

89 — [454] **Numerical modeling of thin porous media with LBM.**
Tobias Forslund; Sofia Larsson; Staffan Lundstrom

90 — [385] **Rock-typing of heterogeneous rock samples via Minkowski functionals and hydraulic attributes.**
Han Jiang; Christoph Arns

91 — [87] **Natural designs of efficient heat and mass exchangers.**
Solberg Simon B. b.; Elisa Magnanelli; Natalya Kizilova; Signe Kjelstrup; Mario Acquarone; Lars Folkow

92 — [405] **Modified Low Salinity Water Efficiency by Advanced Core-Flooding under X-Ray Tomographic Monitoring.**
Leili Moghadasi; Dario Renna; Sara Scagliotti; Patrizia Pisicchio; Martin Bartosek; Franco Masserano; Michela De Simoni

93 — [410] **Dust suppression by enzyme induced carbonate precipitation (EICP) in soils.**
Jun Young Song; Youngjong Sim; Jaewon Jang; Tae Sup Yun

94 — [61] **Hydrate growth in porous media – implications to the water permeability of hydrate-bearing sediments.**
Lele Liu; Zhun Zhang; Chengfeng Li; Jianchao Cai; Daigang Wang; Changling Liu

95 — [221] **Investigation on the multi-parameter of hydrate-bearing media using nano-focus X-ray computed tomography.**
Chengfeng Li; Changling Liu; Gaowei Hu; Jianye Sun; Lele Liu

96 — [894] **Genetic Mechanism of Diverse Pores in Bioclastic Limestone and Impacts on Reservoir Quality.**
Fengfeng Li; Rui Guo; Wenju Sun; Yichang Yu

97 — [954] **Object-based modeling of braided river reservoir interbed constrained by genetic density.**
Siyang Li

98 — [848] **Increasing capacity of CO2 sequestration by brine production.**
Seyyed Ghaderi; Yuri Leonenko

99 — [744] **Depth-dependent Flow and Pressure Characteristics in Brain Microvascular Networks.**
Franca Schmid; Bruno Weber; Patrick Jenny

Poster exhibition: Session 1 *(cont.)*

Poster board	Exhibition Hall
100	[150] **Pore-scale direct numerical simulations of non-continuum flows by solving kinetic model equations in OpenFOAM.** *Lianhua Zhu; Minh-Tuan Ho; Peng Wang; Yonghao Zhang*
101	[523] **Pore-scale simulation of shale oil flow based on pore network model.** *Ke Wang; Yongfei Yang; Jun Yao; Yaohao Guo; Zhihui Liu*
102	[899] **Dynamic Effects of Capillary Number on Relative Permeability of Porous Sandstone and Carbonate Rocks.** *Ying Da Wang; Traiwit Chung; James McClure; Ryan Armstrong; Peyman Mostaghimi*
103	[94] **Biofilms in porous media: laboratory experiments, mathematical modelling, and upscaling.** *David Landa Marban; Florin Adrian Radu; Kundan Kumar; Iuliu Sorin Pop; Liu Na; Bodtker Gunhild; Petterson Per; Vik Bartek Florczyk*
104	[927] **Heavy oil recovery and asphaltenes deposition mechanism in solvent based recovery technique.** *Xuesong Li; Steffen Berg; Matthias Appel*

Tuesday Detailed Program

Must See sight: Cabecera Park

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WEDNESDAY, 8 MAY 2019

Plenary Session 3

Plenary Lecture

Auditorium 1 - 08:30
Chair: *Steffen Berg*

Prof. Tiina Roose

Biological and Environmental Modelling
within Engineering and the Environment
University of Southampton.

Multiscale Modelling of Plant-Soil Interaction

In this talk I will describe a state of the art image based model of the soil-root interactions, i.e., a quantitative, model of the rhizosphere based on fundamental scientific laws. This will be realised by a combination of innovative, data rich fusion of structural imaging methods, integration of experimental efforts to both support and challenge modelling capabilities at the scale of underpinning bio-physical processes, and application of mathematically sound homogenisation/scale-up techniques to translate knowledge from rhizosphere to field scale. The specific science question I will address with these techniques is how to translate this knowledge from the soil pore and single root scale to root system, field and ecosystem scale in order to predict how the climate change, different soil management strategies and plant breeding will influence the soil fertility.

Must See sight: Valencia's Marina and beaches

Plenary Session 3 *(cont.)*

Plenary Pitch
Auditorium 1 - 09:10
Chair: *Steffen Berg*

Prof. Veerle Cnudde
Ghent University

Imaging pore scale processes in geomaterials

Mass transport, fluid flow, evolving pores, mineral crystallization and dissolution, pore clogging and micro-fractures propagation of are all important phenomena closely related to durability studies of geomaterials. The study of these phenomena bears importance to a variety of real-world problems. To fully comprehend the impact of these processes on geomaterials in general, a good understanding of the underlying pore scale dynamics is vital. In this context, 4D pore-scale X-ray imaging offers new and exciting insights and the resulting 4D datasets are valuable to complement modelling studies. Besides providing input, 4D X-ray CT is also a valuable tool for validation of theories and models. We will discuss some of the current possibilities and challenges related to 4D imaging. Examples will be given of different experiments related to the imaging of dynamic pore scale processes in geomaterials.

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 6

MS 9: Pore-scale modelling - Part 6
*Multipurpose room 1 - **Chairs:** Martin Blunt, James McClure*

9:20	[15] **Evaluation of pore space structure due to chemical dissolution of rock matrix.** *Vadim Lisitsa; Dmitry Kolyukhin; Kseniya Gadylshina*
9:38	[27] **Upscaling reactive transport in an evolving porous medium.** *Nadja Ray; Peter Frolkovic; Jens Oberlander*
9:56	[41] **Direct Pore-scale modelling of CO_2 solubility and mineral trapping.** *Julien Maes*
10:14	[368] **Dissolution Dynamics of Air Bubbles Entrained in Porous Media.** *Scott Smith; Matthieu Vandamme; Kimberly Kurtis*
10:32	[758] **Droplet movement into thin porous layer: an inkjet printing case study.** *Hamed Aslannejad; S. Majid Hassanizadeh; Sergey Loginov*

MS 6: Physics of multi-phase flow in diverse porous media - Part 6
*Auditorium 3A - **Chairs:** Sam Jackson, Catherine Spurin*

9:20	[675] **Unraveling the interplay of different sorption-induced deformation mechanisms in a slit pore: an atomistic simulation approach.** *Mingyang Chen; Benoit Coasne; Robert Guyer; Dominique Derome; Jan Carmeliet*
9:38	[331] **Do deformation bands influence CO_2 storage volume?** *Carla Romano; James Minto; Charlotte Garing; Christopher Zahasky; Sally M. Benson; Zoe K. Shipton; Rebecca Lunn*
9:56	[359] **Salt polygons and porous media convection.** *Lucas Goehring; Jana Lasser; Joanna Nield*
10:14	[655] **Study of the coupled liquid and oxygen transfer in wood: Application to oak for cooperage.** *Claire Roussey; Julien Colin; Remi Teissier du Cros; Joel Casalinho; Patrick Perré*
10:32	[783] **Experimental and numerical study of gas migration through compacted MX-80 bentonite.** *Laura Gonzalez-Blanco; Enrique Romero; Paul Marschall*

Oral presentations: Parallel sessions 6 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 5
*Auditorium 3B - **Chairs:** Inga Berre, Stefano Berrone*

9:20	[97] **Flow and transport in fractured poroelastic media.** *Ivan Yotov; Ilona Ambartsumyan; Eldar Khattatov; Truong Nguyen*
9:38	[680] **Convergence Analysis Of The Fixed Stress Split Iterative Coupling Scheme In Fractured Heterogeneous Poro-Elastic Media.** *Tameem Almani; Abdulrahman Manea; Kundan Kumar*
9:56	[660] **Simulations of coupled flow and geomechanics in porous media with embedded discrete fractures.** *Matteo Cusini; Nicola Castelletto; Joshua A. White*
10:14	[842] **Stress-induced Anomalous Transport in Natural Fracture Networks.** *Peter Kang; Qinghua Lei; Marco Dentz; Ruben Juanes*
10:32	[618] **Non-linear hydro-mechanics of fluid-filled fractures.** *Patrick Schmidt; Holger Steeb*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 4
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

9:20	[492] **Effective behavior of an upscaled phase field model for reactive transport.** *Carina Bringedal; Iuliu Sorin Pop; Manuela Bastidas*
9:38	[142] **Robust simulation of mineral precipitation-dissolution problems with non-Lipschitz mineral surface area.** *Serge Krautle; Peter Knabner*
9:56	[96] **Effective Model for Crystal Precipitation and Dissolution in a Porous Medium with Perforated Solid Matrix.** *Raphael Schulz*
10:14	[553] **Pore-Scale Phase Field Models for Multi-Phase Flow with Precipitation.** *Lars von Wolff*
10:32	[548] **Homogenization of reactive transport processes through thin heterogeneous layers.** *Markus Gahn; Maria Neuss-Radu; Peter Knabner*

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 6 *(cont.)*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 2
*Room 1 - **Chairs:** Marco Dentz, Branko Bijeljic*

9:20	[280] **Pore-scale visualization and quantification of saturated solute transport using fast micro-computed tomography.** *Stefanie Van Offenwert; Tom Bultreys; Arjen Mascini; Marijn Boone; Veerle Cnudde*
9:38	[46] **Determination of the solute diffusivity, dispersion, skewness , kurtosis and higher-order moments in heterogeneous porous flow via Extended Method of Moments.** *Irina Ginzburg; Alexander Vikhansky*
9:56	[629] **Non-linear biogeochemical reactions in chemical gradients.** *Tanguy Le Borgne; Charlotte Le Traon; Antoine Hubert; Hojjat Borhany*
10:14	[10] **Taylor Dispersion: Evolution from the Initial Condition.** *Brian Wood; Ehsan Taghizadeh; Fransisco Valdes-Parada*
10:32	[91] **Pore-scale characterization of velocity probability distributions in partially saturated porous media.** *Gael Raymond Guedon; Fabio Inzoli; Monica Riva; Alberto Guadagnini*

MS 16: Fluid Interactions with Thin Porous Media - Part 3
*Room 2 - **Chairs:** Nicolae Tomozeiu, Philippe Coussot*

9:20	[871] **Influence of Porous Structure on Electrokinetic Properties of Polymer Membranes.** *Christine Korner; Thomas Luxbacher*
9:38	[2] **Impact of PTFE distribution on water transport in a gas diffusion layer of polymer electrolyte fuel cells.** *Dieter Froning; Junliang Yu; Uwe Reimer; Werner Lehnert*
9:56	[31] **Multicomponent transport in hydrated polymer membranes: Alcohols, Formate and Acetate in Nation 117.** *Breanna Dobyns; Daniel Miller; Bryan Beckingham*
10:14	[402] **Tomographic PIV of low to high Re flow through quadratic and hexagonal arrangements of cylinders.** *Sofia Larsson; Staffan Lundstrom; Henrik Lycksam; Tobias Forslund*
10:32	[653] **Modeling and simulation of transport and reaction processes through digitally generated paper-based membranes** *Andres Abad Gonzalez; Patrick Altschuh; Jamshidi Farshid; Willfried Kunz; Andreas Reiter; Marcel Bremerich; Annette Reiche; Michael Selzer; Britta Nestler*

Oral presentations: Parallel sessions 6 *(cont.)*

MS 19: Electrochemical processes in porous media - Part 1
*Room 6 - **Chairs:** Ezequiel Medici, Andreas Wiegmann*

9:20	[34] **Seeking minimum entropy production for flow-field patterns and their geometries in fuel cells.** *Marco Sauermoser; Natalya Kizilova; Eirik Flekkoy; Bruno G. Pollet; Signe Kjelstrup*
9:38	[59] **The various scenarios of liquid water formation in the cathode gas diffusion layer of PEM fuel cells.** *Pierre Carrere; Marc Prat*
9:56	[336] **Coupling Continuum and Pore-Network Models to Study the Dispersed Nanostructured Thin Film Electrodes of Polymer Electrolyte Fuel Cells.** *Jiangjin Liu; Ezequiel Medici; Jeffrey S. Allen; Andrew Haug; Iryna Zenyuk*
10:14	[542] **Quantifying the influence of microstructure on effective conductivity and permeability: virtual materials testing.** *Matthias Neumann; Ole Stenzel; Francois Willot; Lorenz Holzer; Volker Schmidt*
10:32	[778] **Optimal thickness of porous micro-electrodes operating a single reduction reaction.** *Tien Dung Le; Didier Lasseux; Alexander Kuhn; Nicolas Mano; Gerard Vignoles*

MS 15: Machine Learning Advances in Porous Media - Part 1
*Room 8: **Chairs:** Olwijn Leeuwenburgh, Xiaodong Luo*

9:20	[366] **Machine Learning for Data Assimilation, Uncertainty Quantification of System Performance and Optimization of Controls.** *Albert Reynolds; Zhenyu Guo; Emilio Sousa*
9:38	[500] **A Machine-learning Based Subdomain POD-TPWL for Reservoir History Matching.** *Cong Xiao; Arnold Heemink; Hai Xiang Lin; Olwijn Leeuwenburgh*
9:56	[769] **Predicting fluid flow via convolutional neural networks.** *Javier E. Santos; Masa Prodanovic, Duo Xu, Honggeun Jo, Michael Pyrcz*

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 7

MS 21: Special MS for Prof. Martin Blunt
*Multipurpose room 1 - **Chair:** Branko Bijeljic*

11:20	[314] **Two-phase flow in industrial porous media; Experiments, theory, and modelling.** *S. Majid Hassanizadeh; Hamed Aslannejad; Amir Hossein Tavangarrad*
11:38	[180] **Effects of Inertia, Péclet Number, and Heterogeneity on Flow and (Anomalous) Transport in Heterogeneous Porous Media.** *Brian Berkowitz; Alon Nissan*
11:56	[74] **Imaging and modeling Martin Blunt at the pore scale.** *Ruben Juanes*
12:14	[447] **The effect of pore-scale heterogeneities on capillary trapping for geological storage of CO2.** *Leonardo Ruspini; Paal-Eric Oren; Robert Sok; M. Saadatfar; Anna Herring; Mark Knackstedt*
12:32	[528] **From streamlines and transfer functions to flow diagnostics for naturally fractured reservoirs.** *Sebastian Geiger*

MS 14: Uncertainty Quantification in Porous Media - Part
*Auditorium 3A - **Chairs:** Marcio Borges, Felipe Pereira*

11:20	[388] **A Convergence Analysis of MCMC Methods for Porous Media Flows.** *Abdullah Mamun; Felipe Pereira; Arunasalam Rahunanthan*
11:38	[571] **Adaptive MCMC methods applied to the characterization of rock properties in flow in porous media.** *Marcio Borges; Maicon Correa*
11:56	[375] **Uncertainty Quantification in Discrete Fracture Networks flow simulations.** *Stefano Berrone; Sandra Pieraccini; Stefano Scialo*
12:14	[755] **The multiscale perturbation method for the solution of time-dependent porous media flows.** *Fabricio Sousa; Het Mankad; Ali Alsadig; Felipe Pereira*
12:32	[805] **Towards Bayesian quantification of permeability in micro-scale porous structures – Sandstones and Carbonates.** *Babak Fazel; Mohammad Hossein Golestan*

Oral presentations: Parallel sessions 7 *(cont.)*

MS 12: Advances in mathematical modeling and numerical simulation of poromechanics - Part 2
*Auditorium 3B - **Chairs:** Joshua White, Francisco Gaspar*

11:20	[81] **Numerical methods for detection of kidney disease using tissue deformation fields.** *Jan Martin Nordbotten; Erlend Hodneland; Erik Hanson; Eirik Keilegavlen; Arvid Lundervold; Antonella Zanna Munthe-Kaas*
11:38	[228] **On the use of fixed-stress split scheme for the solution of flow problems in deformable porous media.** *Francisco Gaspar; Kundan Kumar; Carmen Rodrigo; Florin Adrian Radu; Manuel Borregales*
11:56	[254] **Advances in conformal mixed finite element methods for generalized poroelasticity.** *Kent-Andre Mardal; Marie E. Rognes; Travis Thompson*
12:14	[320] **An Auxiliary Space Method for Mixed Finite Element Discretizations.** *Batista Juan; Francisco Gaspar; Xiaozhe Hu; Carmen Rodrigo; Ludmil Zikatanov*
12:32	[662] **Cross-property relations between elastic properties and thermal conductivity of partially sintered ceramics and fractured rocks.** *Willi Pabst; Eva Gregorova; Tereza Uhlirova; Vojtech Necina*

MS 4: Swelling and shrinking porous media - Part 1
*Room 3 - **Chairs:** Chris MacMinn, Mojgan Hadi Mosleh*

11:20	[202] **Hygromorphic response dynamics of oak: an NMR study.** *Leo Pel; Arends Thomas; Smeulders David*
11:38	[747] **Experimental and theoretical study of formation of filtration structures in swelling clays.** *Maxim Khramchenkov; Eduard Khramchenkov; Rustem Usmanov*
11:56	[159] **Understanding the Critical Role of Capillary Suction on Rock Mechanical Responses during Post-fracturing Spontaneous Imbibition in Tight Formations.** *Reza Keshavarzi; Rick Chalaturnyk*
12:14	[851] **Water retention behaviour of smectite-rich materials.** *Anne-Catherine Dieudonne; Claude Gatabin; Jean Talandier; Frederic Collin, Robert Charlier*
12:32	[198] **Temperature effects on swelling behaviour of smectite: insight into coupled chemo-mechanical phenomena in charged porous systems.** *Linhua He; Majid Sedighi; Andrey Jivkov; Mojgan Hadi Mosleh*

Oral presentations: Parallel sessions 7 *(cont.)*

MS 15: Machine Learning Advances in Porous Media - Part 2
*Room 1 - **Chairs:** Olwijn Leeuwenburgh, Xiaodong Luo*

11:20	[584] **AI-based identification of binder and fibers in 3D images of nonwoven.** *Andreas Wiegmann; Andreas Griesser; Hans Hagen; Christian Wagner; Rolf Westerteiger*
11:38	[706] **Deep learning from multiphase digital rock simulations.** *James McClure; Ramstad Thomas*
11:56	[290] **Feed-Forward Neural Networks for Flux Regression in Discrete Fracture Networks.** *Stefano Berrone; Francesco Della Santa; Sandra Pieraccini; Francesco Vaccarino*
12:14	[422] **Deep learning-based fracture extraction from X-ray computed tomographic images of fractured porous media.** *Yejin Kim; Seong Jun Ha; Youngjong Sim; Tae Sup Yun*

MS 16: Fluid Interactions with Thin Porous Media - Part 4
*Room 2 - **Chairs:** Philippe Coussot, Marc Prat*

11:20	[207] **Dissolution – precipitation driven migration of a salt crust.** *Marc Prat; Glad Licsandru*
11:38	[56] **Lyphilization front structures in thin layers of frozen solutions.** *Nicole Vorhauer; Petra Forst; Harald Schuchmann; Evangelos Tsotsas*
11:56	[275] **One-particle layer drying kinetics to assess recycled concrete aggregates absorption.** *Emmanuel Keita; Jennifer Nael-Redolfi; Florian Therene; Nicolas Roussel*
12:14	[498] **Experimental determination of fluid and solute transport parameters in textiles.** *Sabine Przybilla; Tobias Wybranietz; Joachim Villwock*
12:32	[833] **Imaging and quantifying the microstructure of polymers and composites using Cryo-BIB-SEM.** *Joyce Schmatz*

Oral presentations: Parallel sessions 7 *(cont.)*

MS 19: Electrochemical processes in porous media - Part 2
*Room 6 - **Chairs:** Andreas Wiegmann, Pablo A. García-Salaberri*

11:20   [99] **Elucidating the effects of tapered flow channels on the performance of vanadium redox flow batteries.**
Carlos Moreno-Carrero; Tugba Ceren Gokoglan; Marcos Vera; Ertan Agar; Pablo A. Garcia-Salaberri

11:38   [308] **Quantifying and Analysing Transport Phenomena in Electrospun Electrodes by X-ray Computed Tomography.**
Matthew Kok; Rhodri Jervis; Dan Brett; Paul R. Shearing; Jeff Gostick

11:56   [101] **Analysis of species mass transport in fibrous electrodes of redox flow batteries.**
Miguel Munoz-Lorente; Jose M. Rubio-Hammo; Fikile R. Brushett; Antoni Forner-Cuenca; Pablo A. Garcia-Salaberri

12:14   [673] **Exploring the Impact of Electrode Microstructure on the Performance of Non-Aqueous Redox Flow Batteries.**
Antoni Forner-Cuenca; Charles Tai-Chieh Wan; Fikile Brushett

12:32   [946] **IFBattery Max Power, Internal Resistance and Specific Energy for an n-Cell System in Series Arrangement.**
John Cushman; Eric Nauman; Mika Dziekan

Must See sight: Plaza de la Virgen and the cathedral quarter

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 8

MS 9: Pore-scale modelling - Part 7
*Multipurpose room 1 - **Chairs:** Martin Blunt, Stephane Zaleski*

14:00	[428] **Mixing-limited bimolecular chemical reactions at pore-scale.** *Lazaro Perez; Alexandre Puyguiraud; Juan J. Hidalgo; Joaquin Jimenez-Martinez; Marco Dentz*
14:18	[473] **Digital Rock Physics for Carbonate Reservoirs - Simulation of Acidizing Treatments.** *Jens-Oliver Schwarz; Liping Cheng; Tom Cvjetkovic; Andreas Wiegmann*
14:36	[505] **Pore-scale modeling of coupled hydro-geochemical processes.** *Cyprien Soulaine; Sophie Roman; Christophe Tournassat*
14:54	[682] **On the Upscaling of Reactive Flow in Plug-Flow Experiments in the Project ResKin.** *Torben Prill; Oleg Iliev; Pavel Gavrilenko*
15:12	[716] **Influence of Charge-Coupled Diffusion and Non-Linear Reaction Kinetics on the Dissolution of Carbonate Rocks: Pore-scale Modelling and Experiments.** *Farrel Gray; Benaiah Anabaraonye; John Crawshaw; Edo Boek*

MS 6: Physics of multi-phase flow in diverse porous media - Part 7
*Auditorium 3A - **Chairs:** Marios Valvanides, Lucas Goehring*

14:00	[326] **Foam Propagation at Low Superficial Velocity: Implications for Long-Distance Foam Propagation.** *Guanqun Yu; William Rossen; Sebastien Vincent-Bonnieu*
14:18	[353] **Scale-up of Laboratory Data for Surfactant-Alternating-Gas Foam EOR.** *Rodrigo Orlando Salazar Castillo; William R. Rossen*
14:36	[382] **Liquid Injectivity in Surfactant-Alternating-Gas Foam Enhanced Oil Recovery: Effect of Superficial Velocity.** *Jiakun Gong; Wendy Flores Martinez; Sebastien Vincent-Bonnieu; Ridhwan Zhafri Kamarul Bahrim; Nasser Bakri Che Mamat; Raj Deo Tewari; Iqbal Mahamad Amir; Jeroen Groenenboom; Rouhi Farajzadeh; William R. Rossen*
14:54	[797] **Investigation of fluid/fluid couplings in two-phase flows: application to soil remediation.** *Maxime Cochennec; Hossein Davarzani; Yohan Davit; Stefan Colombano; Ioannis Ignatiadis; Michel Quintard*
15:12	[561] **In-situ investigation of aging protocol effects on relative permeability measurements using high throughput experimentation methods.** *Matthieu Mascle; Souhail Youssef; Herve Deschamps; Olga Vizika*

Oral presentations: Parallel sessions 8 *(cont.)*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 3
*Auditorium 3B - **Chairs:** Marco Dentz, Branko Bijeljic*

14:00	[733] **Prediction of low velocity distribution from pore structure in simple porous media.** *Pietro De Anna; Bryan Quaife; George Biros*
14:18	[440] **Experimental observations of the spatial structure of the concentration field during solute transport in reservoir rocks by Positron Emission Tomography.** *Takeshi Kurotori; Christopher Zahasky; Sally M. Benson; Ronny Pini*
14:36	[51] **Porous Media Characterisation relavent to Enhanced Gas Recovery.** *Michael Johns; Eric May; Vahab Honari; Marco Zecca ; Milan Patel*
14:54	[213] **Modeling solute transport in segregated porous media: sensitivity-driven calibration of a new double continuum model.** *Giulia Ceriotti; Anna Russian; Diogo Bolster; Giovanni Porta*
15:12	[718] **Water Vapor Diffusive Transport in a Smectite Clay: Cationic Control of Normal vs. Anomalous Diffusion.** *Leander Michels; Yves Meheust; Mario A. S. Altoe; Everton C. dos Santos; Henrik Hemmen; Roosevelt Droppa; Jon O. Fossum; Geraldo J. da Silva*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 5
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

14:00	[168] **A high-order conservative finite element method for Darcy flow problem with transport.** *Eduardo Abreu; Ciro Diaz; Juan Galvis; John Perez*
14:18	[178] **A posteriori error estimates for flow modeling using an Enhanced Velocity scheme.** *Yerlan Amanbek; Gurpreet Singh; Gergina Pencheva; Mary Wheeler*
14:36	[269] **Study of coupled finite volume schemes minimizing the grid orientation effect in reservoir simulation.** *Karine Laurent; Quang Huy Tran; Christophe Berthon; Eric Flauraud; Christophe Preux*
14:54	[427] **Auxiliary space preconditioners for mixed-dimensional H(div) problems.** *Wietse Boon; Ana Budisa; Xiaozhe Hu; Jan Martin Nordbotten*
15:12	[717] **A mixed MoL-TMoL approach for solving 2D Richards' equation in layered soils.** *Marco Berardi; Fabio Difonzo; Michele Vurro; Luciano Lopez*

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 8 *(cont.)*

MS 2: Porous Media for a Green World: Water & Agriculture - Part 1
*Room 1 - **Chairs:** Nima Shokri; Amilcare Porporato*

14:00	[587] **Lake Urmia basin: soil, water, and climate nexus.** *Amirhossein Hassani; Adisa Azapagic; Amir Keshmiri; Nima Shokri*
14:18	[287] **Soil respiration under climate extremes: On the role of root hydraulic redistribution delineated by millifluidics.** *Erfan Haghighi; Joaquin Jimenez-Martinez*
14:36	[560] **Potential application of fungal biogeotechnology as irrigation canal lining material for agricultural water conservation.** *Emmanuel Salifu; Grainne El Mountassir*
14:54	[586] **Water table depth and soil salinity: Pore-scale physics defining large-scale responses.** *Salome M.S. Shokri-Kuehni; Bernadette Raaijmakers; Theresa Kurz; Rainer Helmig; Nima Shokri*
15:12	[724] **Coupled evolution of ecohydrologic processes and pore-size distributions.** *Norman Pelak; Amilcare Porporato*

MS 12: Advances in mathematical modeling and numerical simulation of poromechanics - Part 3
*Room 2 - **Chairs:** Adrian Florin Radu, Francisco Gaspar*

14:00	[377] **Direct simulation of the effect of over-burden pressure on porosity and permeability of unconsolidated sands.** *Bernd Crouse; Juan Bautista; Shaun Gill; David Freed*
14:18	[172] **Microscale Analysis of deforming saturated porous media: Terzaghi stress principle and the Significance of Shear and Plasticity in Hydrostatic Compression.** *Howard Schreyer; Brandon Lampe; Lynn Schreyer; John Stormont*
14:36	[610] **A posteriori error estimation by stress and flux reconstruction for Biot's consolidation model.** *Fleurianne Bertrand*
14:54	[613] **Adaptive fixed-stress iterative coupling schemes based on a posteriori error estimates for Biot's consolidation model.** *Elyes Ahmed; Jan Martin Nordbotten; Florin Adrian Radu*
15:12	[549] **Dependence of shallow landslide stability onset on terrain porosity – an experimental study.** *Vladislav Ivanov; Laura Longoni, Monica Papini*

WEDNESDAY, 8 MAY 2019

Oral presentations: Parallel sessions 8 *(cont.)*

MS 4: Swelling and shrinking porous media - Part 2
*Room 6 - **Chairs:** Chris MacMinn, Mojgan Hadi Mosleh*

14:00	[100] **Capillary imbibition governed by water adsorption in hygroscopic plant-like structure.** *Philippe Coussot; Meng Zhou; Sabine Care*
14:18	[90] **Visualization of dynamic wormhole development in polymer gel using Positron Emission Tomography (PET).** *Bergit Brattekas; Martin Ferno*
14:36	[666] **A study on the microstructure of colloidal silica hydrogel when used as soil grouting material for ground barriers.** *Matteo Pedrotti; Christopher Wong; Eleonora Cali; Bots Pieter; El Mountassir Grainne; Ryan Mary; Lunn Rebecca J.*
14:54	[102] **Three-Dimensional Finite Deformation Measurements of Soft Porous Media using Lens Free Imaging.** *Eanna Fennell; Tairan Liu; Yibo Zhang; Aydogan Ozcan; Jacques Huyghe*
15:12	[834] **Characterisation of the Effect of Microstructure on the Liquid Transport in Porous Media Using Terahertz Spectroscopy and Imaging.** *Mohammed Al-Sharabi; Theona Mudley; Daniel Markl; Prince Bawuah; Anssi Pekka Karttunen; Cathy Ridgway; Patrick Gane; Jarkko Ketolainen; Kai-Erik Peiponen; Thomas Rades; J. Axel Zeitler*

Must Try: Paella, the famous Valencia rice dish

WEDNESDAY, 8 MAY 2019

3-minute pitch presentations: Parallel sessions 2

*Multipurpose room 1 - **Chairs:** Bernd Flemisch; Edo Boek*

15:35 [279] **Permeability upscaling from pore to core scale.**
Lefki Germanou

15:38 [345] **Network model studies of relations between flow velocities in two-phase flow in porous media.**
Magnus Aa. Gjennestad

15:41 [432] **Macro-scale simulation of fibrous liquid aerosol filters.**
Andre Baumann

15:44 [436] **Micro-scale simulation of fibrous liquid aerosol filters.**
Dennis Hoch

15:47 [455] **Experimental Study of Gas Mass Transfer between Gas Bubbles and Water in Otherwise Saturated Sand.**
Tomas Princ

15:50 [547] **Reactive transport modeling in carbonate reservoirs and assessment of the adsorption of oil polar components on the rock surface.**
Maria Bonto

15:53 [818] **Modified salinity water flooding: pore-scale simulations and microfluidic experiments.**
Mohsen Farhadzadeh

15:56 [25] **An improved LBM-DEM model for hydro-mechanical coupled process.**
Zhiqiang Chen

15:59 [453] **Numerical simulation of Santa Olalla lagoon through MODFLOW and Local Grid Refinement package.**
Carmen Serrano Hidalgo

16:02 [598] **Understanding the behavior of BTEX on the vadose zone using simple 1-D finite differences modeling.**
Javier Rodrigo-ilarri

16:05 [858] **Multiscale finite volume method for finite-volume-based simulation of poroelasticity.**
Hadi Hajibeygi

16:08 [914] **Estimating Permeability Decrease in Deformation Bands in Unconsolidated Sandstones by Digital Rock Simulation.**
Ronaldo Herlinger jr

16:11 [944] **Hysteresis in Adsorption and Desorption Isotherm for Shale Gas in Realistic Kerogen models.**
Runxi Wang

3-minute pitch presentations: Parallel sessions 2 *(cont.)*

*Multipurpose room 1 (cont.) - **Chairs:** Bernd Flemisch; Edo Boek*

16:14 | 960] **Direct Visualization of the Inaccessible Pore Volume Effect of Polymer Chains in a Dual Porosity Medium Using a Microfluidic Technique.**
Victor Torrealba

16:17 | [92] **Gradient flow perspective on poroelasticity and energy minimizing splitting schemes.**
Jakub Both

16:20 | [770] **Experimental Study on Gas Accumulation Mechanism of Sandstone Gas Reservoirs in Sulige Gas Field, Ordos Basin, China.**
Xuan Xu

*Auditorium 3A - **Chairs:** Anne-Julie Tinet; Nima Jouybari*

15:35 | [39] **Interface Conditions for Infiltration Problems.**
Elissa Eggenweiler

15:38 | [88] **Domain decomposition techniques for fully coupled reactive transport and multiphase flow in porous media.**
Davide Illiano

15:41 | [143] **Adaptive numerical homogenization: linearization procedure to solve non-linear multi-scale problems.**
Manuela Bastidas

15:44 | [227] **An adaptive upscaling method for unstable multiphase flows in heterogeneous porous media using advanced numerical methods.**
Narges Dashtbesh

15:47 | [418] **Upscaling of two-phase flow models in porous media: from the pore scale to the Darcy scale.**
Sohely Sharmin

15:50 | [433] **A pore-scale approach to couple mass, momentum and energy at the interface between free flow and porous-medium flow.**
Kilian Weishaupt

15:53 | [490] **High-enthalpy Geothermal Simulation with Multi-level Physics Parameterization.**
Yang Wang

15:56 | [585] **Modeling of coupled conductive-radiative heat transfer in a 3D numerical material by a stochastic process.**
Vincent Gonneau

15:59 | [811] **MHFEM with BDDC for two-phase flow in porous media in 2D and 3D.**
Jakub Solovsky

16:02 | [825] **An alternative approach for solving the VTN-stability testing problem of a multicomponent mixture.**
Tomas Smejkal

WEDNESDAY, 8 MAY 2019

3-minute pitch presentations: Parallel sessions 2 *(cont.)*

*Auditorium 3A (cont.) - **Chairs:** Anne-Julie Tinet; Nima Jouybari*

16:05 [857] **On modeling and simulation of multiscale processes in catalytic filters.**
Oleg Iliev

16:08 [626] **An electrochemical impedance spectrocopy technique for determining ionic resistance of ion-exchange membranes.**
V. Maria Barragan

16:11 [681] **Modeling Water Treatment by Capacitive Deionization Using Multiphysics Pore Network Modeling.**
Mehrez Agnaou

16:14 [501] **Mathematical model of microbiological oil recovery with wetting inversion by bio-surfactants.**
Akerke Mukhamediyarova

16:17 [44] **Peltier Heat of porous LiFePO4 electrodes in a thermoelectric cell.**
Astrid F. Gunnarshaug

*Auditorium 3B - **Chairs:** Brian Wood; Bergit Brattekas*

15:35 [819] **Measurement of bare soil evaporation using outdoor lysimeter data.**
Jana Schneider

15:38 [650] **Measuring swelling and shrinkage of porous materials with a digital camera.**
Nikolaj Georgi

15:41 [668] **Scour shape dependency on hydro-mechanical state of compacted clay.**
Raniero Beber

15:44 [20] **An Ensemble-based Learning Framework For History Matching With Imperfect Forward Simulators.**
Xiaodong Luo

15:47 [5] **Impact of wind action and medium physical properties on horizontal pore gas flow in near-surface porous media.**
Tjalfe Poulsen

15:50 [77] **The impact of intraformational baffles on carbon mineralization in CO2 storage reservoirs.**
Achyut Mishra

15:53 [112] **The Adaptability of Foam Profile Control in Low Permeable Heterogeneous Reservoir.**
Lijuan Zhang

3-minute pitch presentations: Parallel sessions 2 *(cont.)*

Auditorium 3B (cont.) - **Chairs:** *Brian Wood; Bergit Brattekas*

15:56 [135] **Solute mixing in the hyporheic region.**
Elisa Baioni

15:59 [450] **Mesh-free simulation for precipitation and dissolution in a 2D discrete fracture network.**
Masoud Ghaderi Zefreh

16:02 [468] **Viscous fingering instability in oscillating systems.**
Chinar Rana

16:05 [920] **Numerical simulations of turbulent flows and heat transfer in regular porous structures.**
Bernhard Weigand

16:08 [922] **Experimental investigation on the stress sensitivity of permeability in naturally fractured shale.**
Diansen Yang

16:11 [953] **Permeability prediction in porous media using multivariant structural regression.**
Matthew Andrew

16:14 [305] **Porous materials for nutrient recirculation from industry to agriculture.**
Mirian Shinzato

16:17 [430] **Impact of subcore-scale permeability heterogeneity on solute mixing in a microporous limestone: experiments and numerical study.**
Swapna Rabha

16:20 [7] **Insight into Influence of Crossflow in layered Sandstone porous media during Miscible and Immiscible CO2 WAG Flooding.**
Eghan Arjomand

16:23 [274] **Effects of spatial heterogeneity on flow and transport in variably saturated porous media.**
Andres Velasquez Parra

16:26 [378] **Development of a Novel Method based on MLP-ANN to Investigate Carbon dioxide capture and Storage.**
Bahareh Hosseini

16:29 [669] **Lagrangian Mass Transfer/Reaction Models: Is Probabilistic Mass Transfer Numerically Equivalent to SPH?**
Guillem Sole-Mari

16:32 [856] **Experimental investigation of the impacts of microtopographic and vegetative roughness elements on near-surface airflow and soil moisture dynamics using a coupled wind tunnel-porous media test-system.**
Andrew Trautz

Wednesday Detailed Program

WEDNESDAY, 8 MAY 2019

Poster exhibition: Session 2

Poster board	*Exhibition Hall*
1	[950] **Imaging pore scale processes in geomaterials** *Veerle Cnudde*
2	[16] **Upscaling of coupled free-flow and porous-media-flow processes.** *Sina Ackermann; Rainer Helmig*
3	[25] **An improved LBM-DEM model for hydro-mechanical coupled process.** *Zhiqiang Chen; Moran Wang*
4	[35] **Hydrodynamic instabilities of immiscible fluids flow in oil reservoir rocks during enhanced oil recovery process.** *Zahreddine Hafsi*
5	[117] **Numerical simulation of coupling flow and geomechanics for fractured reservoirs.** *Xiang Rao; Linsong Cheng; Renyi Cao; Shijun Huang; Yongchao Xue*
6	[169] **Dynamics of foam flow in a rock fracture: Effects of aperture variation on apparent shear viscosity and bubble morphology.** *Mohammad Javad Shojaei; Antonio Rodriguez de Castro; Yves Méheust; Nima Shokri*
7	[204] **Direct observation of the moisture distribution in castables during first dry out at high temperatures: an NMR study.** *Leo Pel; Barakat Ahmed; Adan Olaf*
8	[216] **Analysis of Dynamic Structure Characteristics of Foam Fluid Transport in Porous Media Based on Fractal Theory.** *Fei Wang; Dongxing Du; Xu Dong*
9	[241] **Modeling of pore throat distribution and capillary effect in synthesized artificial core.** *Joseph Fu; Xiang'an Yue; Bo Zhang*
10	[250] **A New Relative Permeability Correlation for Gas Condensate Reservoirs Based on Microscale Force Analysis.** *Juntai Shi; Chengyuan Liu; Zheng Sun; Tao Zhang*
11	[261] **The influence of interfacial tension on spontaneous imbibition of low-permeability water-wet reservoir.** *Aifen Li; Shuaishi Fu; Bingqing He; Qi Fang*
12	[264] **Pore-scale simulation of imbibition process in a 3D digital rock.** *Guangpu Zhu; Jun Yao*
13	[279] **Permeability upscaling from pore to core scale.** *Lefki Germanou; Lei Wu; Yonghao Zhang*
14	[301] **Lattice Boltzmann Modelling of surfactant adsorption and transport in porous media.** *Zaineb Zaafouri; Benoit Coasne; Guillaume Batot; Carlos Nietos Draghi; Daniela Bauer*

Poster board	Exhibition Hall
15	[345] **Network model studies of relations between flow velocities in two-phase flow in porous media.** *Magnus Aa. Gjennestad; Mathias Winkler; Alex Hansen*
16	[846] **Imaging of porosity of concrete hydrates by (Cryo/LMI-) BIB-SEM.** *Jop Klaver; Christiane Roessler; Joyce Schmatz; Christian Matthes; Mingze Jiang*
17	[432] **Macro-scale simulation of fibrous liquid aerosol filters.** *Andre Baumann; Dennis Hoch; Jennifer Niessner*
18	[436] **Micro-scale simulation of fibrous liquid aerosol filters.** *Dennis Hoch; Andre Baumann; Jennifer Niessner*
19	[453] **Numerical simulation of Santa Olalla lagoon through MODFLOW and Local Grid Refinement package.** *Carmen Serrano Hidalgo; Carolina Guardiola Albert; Javier Heredia Diaz; Francisco Javier Elorza Tenreiro*
20	[455] **Experimental Study of Gas Mass Transfer between Gas Bubbles and Water in Otherwise Saturated Sand.** *Tomas Princ; Michal Snehota*
21	[520] **Mathematical modelling of modified salinity water flooding in carbonate rocks.** *Mirhossein Taheri; Maria Bonto; Karen Louise Feilberg; Ali Akbar Eftekhari; H. M. Nick*
22	[547] **Reactive transport modeling in carbonate reservoirs and assessment of the adsorption of oil polar components on the rock surface.** *Maria Bonto; Ali Akbar Eftekhari; H. M. Nick*
23	[595] **Freezing and thawing of water in fully saturated packed sand sample.** *Martina Sobotkova; Alexandr Zak; Michal Snehota; Michal Benes*
24	[598] **Understanding the behavior of BTEX on the vadose zone using simple 1-D finite differences modeling.** *Javier Rodrigo-Ilarri; Maria-Elena Rodrigo-Clavero; Luis Romero-Ballesteros*
25	[818] **Modified salinity water flooding: pore-scale simulations and microfluidic experiments.** *Mohsen Farhadzadeh; Maria Bonto; Ali Akbar Eftekhari; Murat Nulati Yesibolati; Kristian Molhave; H. M. Nick*
26	[824] **Hydro-mechanical effects on the stability of RJD wells and production rate.** *Mohammad Reza Hajiabadi; H. M. Nick*

Wednesday Detailed Program

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
27	[858] **Multiscale finite volume method for finite-volume-based simulation of poroelasticity.** *Hadi Hajibeygi; Irina Sokolova*
28	[914] **Estimating Permeability Decrease in Deformation Bands in Unconsolidated Sandstones by Digital Rock Simulation.** *Ronaldo Herlinger jr; Joao Paulo Pereira Nunes; Rodrigo Surmas; Andreidy Andry Andrade; Abraham Grader*
29	[944] **Hysteresis in Adsorption and Desorption Isotherm for Shale Gas in Realistic Kerogen models.** *Runxi Wang; Qiang Sheng; Jun Li; Matthew Borg; Yonghao Zhang; Jason Reese*
30	[960] **Direct Visualization of the Inaccessible Pore Volume Effect of Polymer Chains in a Dual Porosity Medium Using a Microfluidic Technique.** *Victor Torrealba; Hussein Hoteit*
31	[663] **Dynamics of multiphase flow in porous media: pore-filling I-n mechanisms, snap-off and trapping.** *Kamaljit Singh; Tom Bultreys; Ali Q. Raeini; Branko Bijeljic; Martin Blunt*
32	[39] **Interface Conditions for Infiltration Problems.** *Elissa Eggenweiler; Jim Magiera; Iryna Rybak*
33	[88] **Domain decomposition techniques for fully coupled reactive transport and multiphase flow in porous media.** *Davide Illiano; Florin Adrian Radu; Olav Moyner*
34	[108] **Experimental study on mechanical properties of granite subjuected to temperature and cyclic stress.** *Yaoqing Hu*
35	[143] **Adaptive numerical homogenization: linearization procedure to solve non-linear multi-scale problems.** *Iuliu Sorin Pop; Carina Bringedal; Florin Adrian Radu; Manuela Bastidas*
36	[227] **An adaptive upscaling method for unstable multiphase flows in heterogeneous porous media using advanced numerical methods.** *Narges Dashtbesh; Guillaume Enchery; Benoit Noetinger; Beatrice Riviere*
37	[255] **A discrete Boltzmann method investigation for the micro-compressible-thermal flow in porous media with nonequilibrium effect.** *Ge Zhang; Aiguo Xu; Xiaomian Hu; Yingjun Li*
38	[328] **Multiphase multicomponent flow in porous media with general reactions.** *Markus Knodel; Serge Krautle; Peter Knabner*

Wednesday Detailed Program

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
39	[335] **A Study in Earthquake and Porous Medium: A Numerical Approach in Disordered Systems.** *Subhadeep Roy*
40	[418] **Upscaling of two-phase flow models in porous media: from the pore scale to the Darcy scale.** *Sohely Sharmin; Iuliu Sorin Pop; Carina Bringedal*
41	[433] **A pore-scale approach to couple mass, momentum and energy at the interface between free flow and porous-medium flow.** *Kilian Weishaupt; Timo Koch; Vahid.J Niasar; S. Majid Hassanizadeh; Rainer Helmig*
42	[470] **The effect of saturation dependent capillary diffusion on radial Buckley-Leverett flow.** *Bernard Meulenbroek; Negar Khoshnevis Gargar; Hans Bruining*
43	[490] **High-enthalpy Geothermal Simulation with Multi-level Physics Parameterization.** *Yang Wang; Denis Voskov; David Bruhn*
44	[574] **A coupled flow-DEM approach to investigate the effect of embedded gravel on the propagation of hydraulic fractures in glutenite reservoirs.** *Guodong Zhang; Ruobing Niu; Bingjie Liu; Kun Chao*
45	[585] **Modeling of coupled conductive-radiative heat transfer in a 3D numerical material by a stochastic process.** *Vincent Gonneau; Denis Rochais; Franck Enguehard; Gerard Louis Vignoles*
46	[659] **A local time-stepping (LTS) strategy for fully-implicit simulation of multiphase flow in porous media.** *Matteo Cusini; Fanxiang Xu; Hadi Hajibeygi*
47	[811] **MHFEM with BDDC for two-phase flow in porous media in 2D and 3D.** *Jakub Solovsky; Radek Fucik*
48	[825] **An alternative approach for solving the VTN-stability testing problem of a multicomponent mixture.** *Tomas Smejkal*
49	[857] **On modeling and simulation of multiscale processes in catalytic filters.** *Oleg Iliev; Torben Prill; Pavel Gavrilenko; Andro Mikelic*
50	[859] **Calculating the exact volume of intersections between spheres and arbitrary polyhedra.** *Weiwei Li; Martin Brinkmann; Michael Jung; Ralf Seemann; Stephan Herminghaus*

WEDNESDAY, 8 MAY 2019

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
51	[5] **Impact of wind action and medium physical properties on horizontal pore gas flow in near-surface porous media.** *Tjalfe Poulsen*
52	[12] **Combination of the in-situ loading scanning experiment and digital core deformation simulation for investigating stress sensitivity mechanism.** *Yanan Hou; Weibo Sui; Zhilin Cheng*
53	[20] **An Ensemble-based Learning Framework For History Matching With Imperfect Forward Simulators.** *Xiaodong Luo*
54	[55] **Properties of A + B -> C reaction fronts under radial advection in three-dimensional systems.** *Alessandro Comolli; Anne De Wit; Fabian Brau*
55	[77] **The impact of intraformational baffles on carbon mineralization in CO2 storage reservoirs.** *Achyut Mishra; Ralf Haese; Abhijit Chaudhuri*
56	[106] **Age of Mixing Ratios.** *Deviyani Gurung; Timothy Ginn*
57	[112] **The Adaptability of Foam Profile Control in Low Permeable Heterogeneous Reservoir.** *Lijuan Zhang; Xiangan Yue*
58	[135] **Solute mixing in the hyporheic region.** *Elisa Baioni; Giovanni Porta; Alberto Guadagnini; Mohaddeseh Mousavi Nezhad*
59	[234] **Swelling behavior of shale/clay: Discrete element modeling, based on Monte-Carlo technique.** *Srutarshi Pradhan*
60	[338] **A robust upscaling of the effective particle deposition rate in porous media.** *Gianluca Boccardo; Rajandrea Sethi; Matteo Icardi*
61	[450] **Mesh-free simulation for precipitation and dissolution in a 2D discrete fracture network.** *Masoud Ghaderi Zefreh; Florian Doster*
62	[464] **Foam: A potential vehicle for fertilizer delivery in soil.** *Mohammad Javad Shojaei; Nima Shokri*
63	[468] **Viscous fingering instability in oscillating systems.** *Chinar Rana; Anne De Wit*

Poster board	Exhibition Hall
64	[586] **Water table depth and soil salinity: Pore-scale physics defining large-scale responses.** *Salome M.S. Shokri-Kuehni; Bernadette Raaijmakers; Theresa Kurz; Rainer Helmig; Nima Shokri*
65	[634] **A machine learning method for joint optimization of well location and hydraulic fracture parameter design.** *Jianchun Xu; Ding Qian*
66	[650] **Measuring swelling and shrinkage of porous materials with a digital camera.** *Nikolaj Georgi; Andrei Kolesnikov*
67	[668] **Scour shape dependency on hydro-mechanical state of compacted clay.** *Raniero Beber; Alessandro Tarantino; Matteo Pedrotti; Rebecca Lunn*
68	[695] **A Dual Domain Stochastic Lagrangian Model for Predicting Transport in Open Channels with Hyporheic Exchange.** *Thomas Sherman; Aaron Packman; David Richter; Diogo Bolster; Kevin Roche*
69	[787] **Hysteresis, sorption, swelling and mechanical behavior of wood: a multiscale study.** *Dominique Derome; Mingyang Chen; Chi Zhang; Benoit Coasne; Sinan Keten; Robert Guyer; Jan Carmeliet*
70	[819] **Measurement of bare soil evaporation using outdoor lysimeter data.** *Jana Schneider; Jan Vanderborght; Youri Rothfuss*
71	[920] **Numerical simulations of turbulent flows and heat transfer in regular porous structures.** *Bernhard Weigand; Yang; Chu; Helimg*
72	[922] **Experimental investigation on the stress sensitivity of permeability in naturally fractured shale.** *Diansen Yang*
73	[953] **Permeability prediction in porous media using multivariant structural regression.** *Matthew Andrew*
74	[155] **A Two-Stage Markov Chain Monte Carlo Method for Full Waveform Inversion.** *Felipe Pereira; Susan Minkoff; Georgia Stuart*
75	[200] **Analysis of numerical error in lattice-Boltzmann simulations of Stokes flow in porous media.** *Siarhei Khirevich; Tadeusz Patzek*

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
76	[203] **A Domain Decomposition Projection Method for the Navier-Stokes Equations Based on the Multiscale Robin Coupled Method.** Camila Lages; Fabricio Sousa; Roberto Ausas; Gustavo Buscaglia; Felipe Pereira
77	[767] **Quantifying Transport Uncertainty in Two-Phase Flow Using Probability Distribution Method.** *Olga Fuks; Daniel W. Meyer; Hamdi Tchelepi*
78	[798] **How seismic faults and well test data analysis may help to better model the sub-seismic faults: a study of impact of a fractal dimension choice on flow.** *Andre Fourno; Alexandre De Lima; Denis Jose Schiozer; Benoit Noetinger*
79	[347] **Surface electric charge inside mesoporous silica at different pore sizes and porosities.** *Murat Barisik; Tumcan Sen*
80	[421] **Gas transport in PEFC gas diffusion layers and an analysis of surface characteristics.** *Dieter Froning; Junliang Yu; Uwe Reimer; Werner Lehnert*
81	[722] **Comparing Upscaled Governing Equations for Transport and Flow Derived via Hybrid Mixture Theory and Homogenization.** *Lynn Schreyer*
82	[161] **Effect of inhomogeneous compression on pressure drop and species transport in electrodes of redox flow batteries.** *Jose M. Rubio-Hammo; Miguel Munoz-Lorente; Paul R. Shearing; Rhodri Jervis; Pablo Angel Garcia-Salaberri*
83	[626] **An electrochemical impedance spectrocopy technique for determining ionic resistance of ion-exchange membranes.** *V. Maria Barragan; Pedro Antoranz; Maria Amparo Izquierdo-Gil; Sagrario Munoz*
84	[305] **Porous materials for nutrient recirculation from industry to agriculture.** *Mirian Shinzato; Juliana Freitas; Tereza da Silva Martins; Luis Fernando Wu; Thais Oliveira Mariano*
85	[23] **A unified model for liquid rise in a single capillary tube.** *Zhilin Cheng; Weibo Sui; Yanan Hou; Yingying Tian*
86	[86] **Particle Transport and Deposition Characteristics in 3D Horizontal Fracture with Roughness.** *Xiaoyu Wang; Jun Yao; Hai Sun; Liang Gong; Lei Zhang; Wen Chao Liu; Yang Li*

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
87	[430] **Impact of subcore-scale permeability heterogeneity on solute mixing in a microporous limestone: experiments and numerical study.** *Swapna Rabha; Takeshi Kurotori; Ronny Pini*
88	[7] **Insight into Influence of Crossflow in layered Sandstone porous media during Miscible and Immiscible CO2 WAG Flooding.** *Duraid Al-Bayati; Ali Saeedi; Ipek Ktao; Matthew Myers; Cameron White; Quan Xie*
89	[274] **Effects of spatial heterogeneity on flow and transport in variably saturated porous media.** *Andres Velasquez Parra; Matthias Willmann; Tanguy Le Borgne; Yves Meheust; Joaquin Jimenez-Martinez*
90	[92] **Gradient flow perspective on poroelasticity and energy minimizing splitting schemes.** *Jakub Both; Kundan Kumar; Jan Martin Nordbotten; Florin Adrian Radu*
91	[4] **Development and Calibration of an Analytical Model for Unconventional Wells Using Machine Learning Techniques.** *Qi Zhang; Yu Zhao; Yuliang Su*
92	[378] **Development of a Novel Method based on MLP-ANN to Investigate Carbon dioxide capture and Storage.** *Houman Darvish; Karim Rouhibakhsh; Mohsen Zare; Abdolreza Kazemi Abadshapoori*
93	[669] **Lagrangian Mass Transfer/Reaction Models: Is Probabilistic Mass Transfer Numerically Equivalent to SPH?** *Guillem Sole-Mari; Michael Schmidt; David Benson*
94	[628] **A method for determining through-plane thermal conductivity of polymeric membranes.** *Sagrario Munoz; Maria Amparo Izquierdo-Gil; Pedro Antoranz; V. Maria Barragan*
95	[344] **Experimental modelling of the oscillating.** *Ivan Zavialov; Plyashkov Egor; Rinat Plavnik*
96	[171] **The Behavior of Liquid Percolation and Water Uptake in Catalytic Porous Materials used in Proton Exchange Membrane Fuel Cells (PEMFC).** *Sofyane Abbou; Ezequiel Medici; Karrar Alofari*
97	[856] **Experimental investigation of the impacts of microtopographic and vegetative roughness elements on near-surface airflow and soil moisture dynamics using a coupled wind tunnel-porous media test-system.** *Andrew Trautz; Tissa Illangasekare; Stacy Howington; Matthew Reimann; Ignacio Rodriguez-Iturbe*

Wednesday Detailed Program

Poster exhibition: Session 2 *(cont.)*

Poster board	Exhibition Hall
98	[726] **Mass dispersion between a fluid region and a porous medium.** *Roel Hernandez-Rodriguez, Oscar A. Luevano-Rivas, J. Alberto Ochoa-Tapia*
99	[514] **One-domain approach for immiscible two-phase dispersed flow in stratified porous media.** *Roel Hernandez-Rodriguez, Oscar A. Luevano-Rivas, J. Alberto Ochoa-Tapia*
100	[681] **Modeling Water Treatment by Capacitive Deionization Using Multiphysics Pore Network Modeling.** *Mehrez Agnaou; Jeff Gostick*
101	[501] **Mathematical model of microbiological oil recovery with wetting inversion by bio-surfactants.** *Akerke Mukhamediyarova; Mikhail Panfilov*
102	[521] **Impact of Temperature on Sandstone based on CT images.** *Haiyuan Yang; Yongfei Yang; Jun Yao*
103	[75] **An upscaled transport model of shale gas considering multiple mechanisms and heterogeneity based on homogenization theory.** *Weipeng Fan; Hai Sun; Jun Yao*
104	[770] **Experimental Study on Gas Accumulation Mechanism of Sandstone Gas Reservoirs in Sulige Gas Field, Ordos Basin, China.** *Xuan Xu; Yong Hu; Weijun Shen; Chunyan Jiao; Jiping Wang; Yingli Chen*
105	[44] **Peltier Heat of porous LiFePO4 electrodes in a thermoelectric cell.** *Astrid F. Gunnarshaug; Frank Richter; Odne S. Burheim; Preben J. S. Vie; Signe Kjelstrup*
106	[147] **Wicking simulations of cryogenic liquid into superheated porous structures.** Dawid Zimnik

Procter & Gamble

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We will provide branded products and services of superior quality and value that improve the lives of the world's consumers, now and for generations to come. As a result, consumers will reward us with leadership sales, profit and value creation, allowing our people, our shareholders, and the communities in which we live and work to prosper.

Our Promise:
Two billion times a day, P&G brands touch the lives of people around the world. P&G people work to make sure those brands live up to their promise to make everyday life just a little bit better.

P&G at a Glance:
- Countries of Operations: ~70
- Countries Where Our Brands Are Sold: 180+
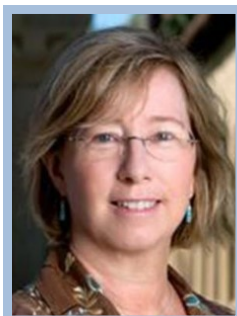- Sales: $66.8 billion

Core Strengths:
Consumer Understanding; Go-to-Market; Brand-Building; Scale; Innovation; Productivity

Innovation:
- Innovation is core to driving the long-term growth of our business
- We invest more in innovation than any other company in our industry ($1.9 billion)
- Over 6,700 R&D employees worldwide
- Through innovation we fulfill our purpose to improve the consumers' lives, looking carefully for sustainability opportunities at every touch point along our products' development path. We do this by developing new materials, packaging innovations and alternative energy programs that allow us to deliver more sustainable products. Also, we leverage on cutting edge technologies such as virtual modeling and simulation tools to maximize our efficiency
- Innovation work covers product research, product development, process development and manufacturing capability, packaging development, analytical & microbiology, product safety & regulatory affairs, etc.
- If you are interested to career opportunities in P&G R&D, please visit http://germany-austria.pgcareers.com/ for more information and online application.

THURSDAY, 9 MAY 2019

Invited Speakers: Session 2

Prof. Sally M Benson
Stanford University
Auditorium 2 - 08:30
Chair: *Rainer Helmig*

Long Term Evolution of Residually Trapped Carbon Dioxide Due to Ostwald Ripening

Residual trapping, the process by which a non-wetting phase fluid become immobilized during imbibition, is an important for increasing the capacity and security of CO_2 storage in deep underground geological formations. Due to the importance of this mechanism, we have investigated whether or not immobilization and residual trapping is permanent. Ostwald Ripening is one process that could destabilize residually trapped CO_2. In principle, driven by differences in capillary pressure between individual ganglia, non-wetting phase ganglia with high capillary pressure will shrink due to diffusive transport of CO_2 to nearby clusters with lower capillary pressure. Growing ganglia could potentially aggregate and become mobilized if they exceed the capillary entry pressures of adjacent pores.

To investigate this process, we have used a combination of synchrotron X-ray microtomography to calculate the distribution of capillary pressures in rocks, pore-scale modeling of Ostwald Ripening in realistic pore structures, and continuum scale modeling. Our work shows that shortly after imbibition occurs, there this a potential for Ostwald Ripening due to the observation that capillary pressures differ between nearby ganglia. Pore scale modeling shows that over days to years, capillary pressure will equilibrate due to redistribution of the CO_2 due to Ostwald Ripening. Importantly, our work demonstrates than unlike for gas bubbles in a bulk fluid, stable multi-bubble equilibrium is possible and even likely due to the stabilizing effects of the pore walls. However, mesoscale heterogeneities in rocks associated with laminations and shifting deposition regimes, creates a situation where Ostwald Ripening will lead to distribution of CO_2. To understand the time scales over which this will occur, we have developed an analytical solution that captures the continuum scale redistribution of the non-wetting phase. We show these processes are slow, and unlikely to lead to significant CO_2 remobilization on time scales relevant to CO_2 storage.

Prof. Jan Carmeliet

ETH Zurich
Auditorium 3A - 08:30
Chair: *Brian Berkowitz*

Multiphase flow and phase change processes in porous materials: coupled experimental-computational approach at pore scale.

In the last decades, the study of fluid flow at pore scale has developed rapidly where more and more performant imaging and modeling techniques have become available towards understanding multiphase flow and phase change processes.

In this presentation, we will focus on three applications of imaging and predictive modeling at pore scale covering a range of possible applications.

First, we will present lattice Boltzmann method (LBM) modeling and measuring of non-isothermal drying of colloid suspension in a complex spiral-shaped micro-pore pillar structure showing capillary pumping.

Then, we will present time- and spatial-resolved 3D imaging and image analysis of the wicking process in textile yarns using fast synchrotron X-ray micro-tomography (time step of 1 sec.) allowing to follow the water filling process of each voxel, at 2.75 mm resolution.

Finally, we propose to couple a pore network model with LBM, where the latter is used to simulate the flow in each pore-throat element and obtain the saturation/conductivity - capillary relationships. Machine learning based on pore shape parameters is used to speed up this process.

Thursday Detailed Program

THURSDAY, 9 MAY 2019

Invited Speakers: Session 2 *(cont.)*

Prof. Matthias Thommes
University Erlangen-Nürnberg
Auditorium 3B - 08:30
Chair: *Matteo Icardi*

Progress and challenges in the textural characterization of nanoporous materials.

Assessing adsorption properties of nanoporous materials and their structural characterization is crucial for advancing their application in catalysis, separations, and other industrial processes. In this lecture we will review the major progress made within the last two decades in the area of physical adsorption characterization [1], but will also discuss the existing challenges in the characterization of advanced porous materials exhibiting hierarchical pore-network structures [2].

References
[1] M. Thommes, K. Kaneko, A.V. Neimark, J.P. Olivier, F. Rodriguez Reinoso, J. Rouquerol
and K.S.W Sing, (IUPAC Technical Report), Pure Appl. Chem. 87, 1051 (2015)
[2] K. A. Cychosz, R. Guillet-Nicolas, J. Garcia-Martinez, J., M. Thommes, M. Chem. Soc. Rev.
46, 389, (2017)

Dr. Alexandre Tartakobsky

Pacific Northwest National Laboratory
Room 3 - 08:30
Chair: *Peyman Mostaghimi*

Learning Parameters and Constitutive Relationships with Physics-Informed Deep Neural Networks

I will present a physics-informed deep neural network (DNN) method for estimating parameters and unknown physics (constitutive relationships) in partial differential equation (PDE) models. We use PDEs in addition to measurements to train DNNs to approximate unknown parameters and constitutive relationships as well as states. The proposed approach increases the accuracy of DNN approximations of partially known functions when a limited number of measurements is available and allows for training DNNs when no direct measurements of the functions of interest are available. Physics-informed DNNs are used to estimate the unknown space-dependent diffusion coefficient in a linear diffusion equation and an unknown constitutive relationship in a non-linear diffusion equation. For the parameter estimation problem, we assume that partial measurements of the coefficient and states are available and demonstrate that under these conditions, the proposed method is more accurate than state-of-the-art methods. For the non-linear diffusion PDE model with a fully unknown constitutive relationship (i.e., no measurements of constitutive relationship are available), the physics informed DNN method can accurately estimate the non-linear constitutive relationship based on state measurements only. Finally, I will demonstrate that the proposed method remains accurate in the presence of measurement noise.

THURSDAY, 9 MAY 2019

Oral presentations: Parallel sessions 9

MS 9: Pore-scale modelling - Part 8
*Multipurpose room 1 - **Chairs:** Stephane Zaleski, James McClure*

9:10	[188] **Stochastic mechanisms of dispersion in a porous medium: Upscaling flow and transport from the pore to the Darcy scale.** *Marco Dentz; Matteo Icardi; Juan J. Hidalgo*
9:28	[64] **A comparative study of elastic, single- and two-phase REV of porous rocks.** *Joao Paulo Pereira Nunes; Rodrigo Surmas; Thomas Oliveira*
9:46	[73] **Utilization of Lattice Boltzmann Method to Study Disjoining Pressure in Porous Media.** *Mohammad Bagher Asadi; Sohrab Zendehboudi*
10:04	[293] **Direct numerical simulation and characterization of flame propagation regimes in porous inert media.** *Sadaf Sobhani; Joseph Ferguson; Matthias Ihme*
10:22	[146] **Microfluidics Experiments and Lattice Boltzmann Simulations to Characterize Multi-phase Flow and Particle Transport in Fracture Networks.** *Hari Viswanathan; Phong Nguyen; Bill Carey; Duncan Ryan; Qinjun Kang; Yu Chen; Jim Werner*

MS 6: Physics of multi-phase flow in diverse porous media - Part 8
*Auditorium 3A - **Chairs:** Andrea Ferrari, Carla Romano*

9:10	[256] **Flexible Framework for Two-Phase-Flow in Extremely Heterogeneous Media.** *Tatiana Reiche*
9:28	[47] **A Multiphase Darcy-Brinkman-Biot Approach to Modeling the Hydrology and Mechanics of Porous Media Containing Macropores and Deformable Microporous Regions.** *Francisco Carrillo; Ian Bourg*
9:46	[288] **Understanding the Co-Moving Velocity.** *Alex Hansen; Dick Bedeaux; Signe Kjelstrup*
10:04	[276] **Effective Viscosity of Immiscible Two-phase Flow in Porous Media at High Capillary Number.** *Santanu Sinha; Magnus Aa. Gjennestad; Morten Vassvik; Mathias Mathias; Alex Hansen; Eirik Flekkoy*
10:22	[728] **Recent advances in the DeProF theoretical framework for two-phase flows in porous media - Where we stand and where we could go.** *Marios Valavanides*

Oral presentations: Parallel sessions 9 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 6
*Auditorium 3B - **Chairs:** Holger Steeb, Hamid Nick*

9:10	[323] **The Virtual Element method for simulations of physical phenomena on Discrete Fracture Matrix models.** *Andrea Borio; Stefano Berrone; Stefano Scialo; Fabio Vicini; Matias Fernando Benedetto*
9:28	[249] **Computing Fluid Flow through Discrete Fracture Networks by Using Combinatorial Optimization on Graph Networks.** *Alex Hobe; Daniel Vogler; Martin P. Seybold; Anozie Ebigbo; Randolph R. Settgast; Martin O. Saar*
9:46	[380] **Adaptive mesh refinement for large scale Discrete Fracture Network flow simulations.** *Stefano Berrone; Andrea Borio; Sandra Pieraccini; Stefano Scialo; Fabio Vicini*
10:04	[458] **Topological characterization of 3D printing fracture networks.** *Anna Suzuki; Miyuki Miyazawa; Megumi Konno; Takatoshi Ito*
10:22	[630] **The laplace transform embedded discrete fracture model method for the simulation of complex fracture system.** *Jianchun Xu; Sun Baojiang; Wei Zhang*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 4
*Room 3 - **Chairs:** Marco Dentz, Branko Bijeljic*

9:10	[199] **3D simulation of flow and active-passive tracer propagation in Voronoi tessellation-based fractured geometries.** *Siarhei Khirevich; Tadeusz Patzek*
9:28	[65] **Multiphase multi-rate mass transfer model for anomalous transport in fractured and heterogeneous media.** *Matteo Icardi; Federico Municchi*
9:46	[292] **A predictive spatial Markov model for transport in heterogeneous Darcy flows.** *Alessandro Comolli; Vivien Hakoun; Marco Dentz*
10:04	[534] **Interplay among Roughness, Flow, and Transport in Rough Single Fractures: The Critical Role of Velocity Correlation on Anomalous Transport.** *Seonkyoo Yoon; Peter Kang*
10:22	[714] **Natural Time Scales of the Monod type kinetics: experimental support by photocatalysis and oxygen consumption in saturated porous media.** *Elena Sanchez-Badorrey; Ronald E. Vargas Balda; Lucia L. Sanchez Sanchez; Maria Ojeda*

THURSDAY, 9 MAY 2019

Oral presentations: Parallel sessions 9 *(cont.)*

MS 2: Porous Media for a Green World: Water & Agriculture - Part 2
*Room 1 - **Chairs:** Nima Shokri; Amilcare Porporato*

9:10	[365] **Coupling virus and salinity transport through porous media.** *Dong Zhang; Michael Zabarankin; Valentina Prigiobbe*
9:28	[712] **Opposite effects of water repellency phenomenon on transport and release of Escherichia coli and PTCC1767 Rhodococcus erythropolis through dry natural soils.** *Nasrollah Sepehrnia; Jorg Bachmann; Mohammad Ali Hajabbasi; Fereidoun Rezanezhad; Lubomir Lichner; Paul Hallett; Marc Coyne*
9:46	[704] **Adaptive pores for oil permeation from oil-in-water emulsions.** *Hanieh Bazyar; Thejas Hulikal Chakrapani; Wouter K. den Otter; Stefan Luding; Rob G. H. Lammertink*
10:04	[413] **Evaporation in multi-component systems.** *Katharina Heck; Lisa Bahlmann; Kilian Weishaupt; Rainer Helmig; Bernd Flemisch*
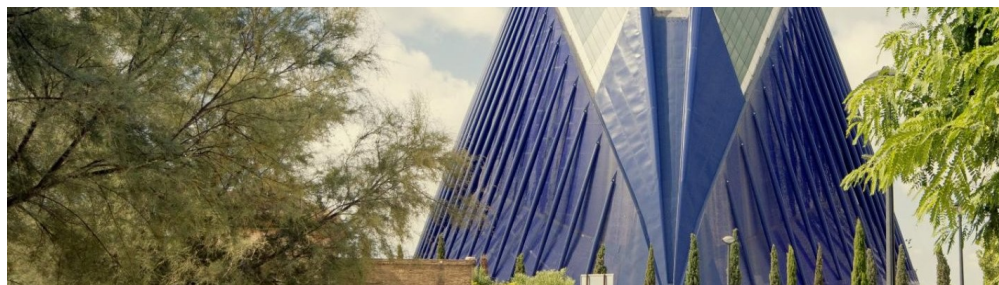
Must See sight: Turia Gardens

MS 11: Microfluidics in porous systems - Part 3
*Room 2 - **Chairs:** Pietro de Anna, Vahid Niasar, Hassan Mahani*

9:10	[527] **Colloidal deposition in 3D porous media, a multi-scale approach.** *Gaetan Gerber; Philippe Coussot*
9:28	[604] **Thermally Induced Nanoparticle Delivery to Porous Media via Emulsions.** *Usua Amanam; Anthony Kovscek; Huang Zeng*
9:46	[615] **The effect of ionic strength on the development and evolution of two phase flow in an artificial porous medium.** *Nikolaos Karadimitriou; Vahid.J Niasar; Hassan Mahani; Holger Steeb*
10:04	[620] **Regeneration of capillary state for water occluded in dual-porosity systems.** *Lionel Mercury; Claudie Hulin*

Oral presentations: Parallel sessions 9 *(cont.)*

MS 13: Fluids in Nanoporous Media - Part 3
*Room 6 - **Chairs:** Gennady Gor, Patrick Huber*

9:10	[32] **Accurate thermodynamic analysis of supercritical fluids adsorption on shale and coal.** *Xu Tang; Robert Mokaya*
9:28	[573] **Displacement of methane by injecting water into shale nanopores using molecular dynamics simulations.** *Youzhi Hao; Detang Lu*
9:46	[569] **Effects of adsorption-induced deformation of microstructure on fluid flow in smectite.** *Majid Sedighi; Tian Chen; Andrey Jivkov; Suresh Seetharam*
10:04	[218] **In-pore solidification: from nanoscale origin to mesoscale damage.** *Katerina Ioannidou; Edmond Tingtao Zhou; Martin Bazant; Roland Pellenq*
10:22	[214] **A new gas transport model of shale stratum based on fractal porous media.** *Jianchao Cai; Wei Wei; Duanlin Lin*

MS 19: Electrochemical processes in porous media - Part 3
*Room 8 - **Chairs:** Pablo A. García-Salaberri, Ezequiel Medici*

9:10	[313] **Optimizing the performance of batteries using digital material engineering.** *Erik Glatt; Fabian Biebl; Ilona Glatt; Christian Wagner; Andreas Wiegmann*
9:28	[559] **The importance of passive materials in Li-Ion battery electrodes.** *Timo Danner; Simon Hein; Daniel Westhoff; Benedikt Prifling; Volker Schmidt; Arnulf Latz*
9:46	[633] **Modeling of lithium ion batteries with emphasis on spatial fluctuations and mechanical effects on the electrode pore scale.** *Jan Lammel; Tobias Hofmann; Jochen Zausch*
10:04	[460] **Pore-Scale Study of Multi-Species Ion Transports through Inhomogeneously Charged Nanoporous Media.** *Amer Alizadeh; Moran Wang*
10:22	[636] **Characterization of sands and sandstones using electrical impedance spectroscopy.** *Alex Kirichek; Claire Chassagne*

Thursday Detailed Program

THURSDAY, 9 MAY 2019

Oral presentations: Parallel sessions 10

MS 9: Pore-scale modelling - Part 9
*Multipurpose room 1 - **Chairs:** Martin Blunt, James McClure*

11:10	[153] **Direct numerical simulation of two-phase flow at the micro-scale using a volume-of-fluid method.** *Mosayeb Shams; Branko Bijeljic; Martin Blunt*
11:28	[838] **Generalized network modelling: validation using micro-CT images of two-phase flow.** *Ali Qaseminejad Raeini; Jianhui Yang; Igor Bondino; Ying Gao; Qingyang Lin; Kamaljit Singh; Branko Bijeljic; Martin Blunt*
11:46	[209] **Determination of thermodynamic contact angle based on interfacial energy balance in multiphase flow displacement in porous media.** *Qingyang Lin; Takashi Akai; Branko Bijeljic; Martin Blunt*
12:04	[222] **Direct Numerical Simulations on Mixed-Wet Carbonates: A Comprehensive Workflow from Experiments to Simulations.** *Takashi Akai; Amer Alhammadi; Martin Blunt; Branko Bijeljic*
12:22	[303] **Pore-scale simulation of fluid displacement in micromodels and real rock samples using the CSF-based lattice Boltzmann multiphase model and geometrical wetting model.** *Yu Chen; Albert Valocchi; Qinjun Kang; Hari Viswanathan*

MS 6: Physics of multi-phase flow in diverse porous media - Part 9
*Auditorium 3A - **Chairs:** Andreas Yiotis, Claire Roussey*

11:10	[806] **Convective Flow in Fuel Cell Gas Diffusion Layers and its Impact on Evaporation.** *Adrian Mularczyk; Felix N. Büchi; Jens Eller; Thomas J. Schmidt*
11:28	[60] **Two-equation continuum model of drying: a limiting case of immobile phase.** *Faeez Ahmad; Abdolreza Kharaghani; Evangelos Tsotsas; Marc Prat*
11:46	[295] **Influence of non-adsorbing polymers on drying of fresh mortars: measurement and physical origin.** *Emmanuel Keita; Yasser Rifaai; Patrick Belin; Nicolas Roussel*
12:04	[646] **Design of multilayer porous pavements for optimizing their evaporative cooling potential as a strategy for urban heat island mitigation.** *Andrea Ferrari; Aytac Kubilay; Dominique Derome; Jan Carmeliet*
12:22	[478] **Hybrid LBM simulation of non-isothermal drying of colloid suspension in a micro-pore structure.** *Feifei Qin; Luca Del Carro; Ali Mazloomi Moqaddam; Qinjun Kang; Dominique Derome; Jan Carmeliet*

Oral presentations: Parallel sessions 10 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 7
*Auditorium 3B - **Chairs:** Inga Berre, Holger Steeb*

11:10	[557] **Two-Phase Flow Upscaling For Fractured Reservoirs.** *Christine Maier; Rafael March; Florian Doster; Sebastian Geiger*
11:28	[283] **Unsaturated flow through fracture intersections: competition between gravity and capillary force controls fluid splitting of droplets.** *Zhibing Yang; Song Xue; Yi-Feng Chen*
11:46	[643] **A Finite-Volume Approach for Two-Phase Flow in Fracturing Porous Media.** *Samuel Burbulla; Christian Rohde*
12:04	[416] **Numerical simulation of low salinity waterflood on fractured chalk outcrop-based models.** *Nikolai Andrianov; H.M. Nick*
12:22	[506] **Equilibrium Constraints in Low Salinity Waterflooding of Carbonate Reservoirs.** *Maxim Yutkin; Clayton Radke; Tadeusz Patzek*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 5
*Room 3 - **Chairs:** Marco Dentz, Branko Bijeljic*

11:10	[592] **Chemically-driven convective dissolution in a porous medium.** *Laurence Rongy; Mamta Jotkar; Anne De Wit*
11:28	[124] **Enhanced convective dissolution flux due to an A+B-->C reaction.** *Mamta Jotkar; Laurence Rongy; Anne De Wit*
11:46	[325] **Graph theory to infer mixing capacity in complex systems.** *Joaquin Jimenez-Martinez; Christian Negre; Jeffrey Hyman*
12:04	[289] **Convective mixing in heterogenous porous media.** *Juan J. Hidalgo; Marco Dentz*
12:22	[555] **How does chaos rule concentration gradients in porous flow?** *Joris Heyman; Daniel Lester; Yves Meheust; Tanguy Le Borgne*

Thursday Detailed Program

THURSDAY, 9 MAY 2019

Oral presentations: Parallel sessions 10 *(cont.)*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 6
*Room 1 - **Chairs:** Sorin Pop, Paolo Zunino*

11:10	[170] **A relaxation projection analytical-numerical approach in hysteretic two-phase flows in porous media.** *Wanderson Lambert; Eduardo Abreu; Abel Bustos; Paola Ferraz*
11:28	[408] **Immersed boundary methods for HM-simulations of fractures.** *Cyrill von Planta; Daniel Vogler; Maria Giuseppe Chiara Nestola; Martin O. Saar; Rolf Krause*
11:46	[482] **Linearization and Domain Decomposition Methods for Two-Phase Flow in Porous Media.** *Stephan Lunowa*
12:04	[488] **Adaptive Discontinuous Galerkin Methods for complex flow in porous media.** *Birane Kane; Robert Kloefkorn*
12:22	[493] **Advances in linear solvers for coupled multi-physics problems.** *Massimiliano Ferronato; Matteo Frigo; Nicola Castelletto; Andrea Franceschini; Hamdi Tchelepi*

MS 11: Microfluidics in porous systems - Part 4
*Room 2 - **Chairs:** Pietro de Anna, Vahid Niasar, Hassan Mahani*

11:10	[583] **Natural convection in coarse-grained porous media: pore-scale velocity and temperature measurements.** *Iman Ataei Dadavi; Chris R. Kleijn; Mark J. Tummers*
11:28	[823] **Experimental Investigations of Flow Boiling inside Porous Media at Pore-scale with Micromodels.** *Haowei Hu; Ruina Xu; Peixue Jiang*
11:46	[849] **Direct Visualization of Fluid in Nanopores - Fundamental and Application in Shale with Nanofluidics.** *Junjie Zhong; David Sinton*
12:04	[766] **Coreflood on a Chip: Scaling up of a Micromodel for EOR Experiments.** *Lucas Mejia; Peixi Zhu; Matthew Balhoff; Kishore Mohanty*

Oral presentations: Parallel sessions 10 *(cont.)*

MS 13: Fluids in Nanoporous Media - Part 4
*Room 6 - **Chairs:** Gennady Gor, Patrick Huber*

11:10	[154] **Numerical assessment of organic source rocks' flexibility at the atomistic scale an its implications on transport at the nanoscale.** *Amael Obliger; Jeremie Berthonneau; Pierre-Louis Valdenaire; Roland Pellenq; Jean-Marc Leyssale; Franz Ulm*
11:28	[310] **Analyzing ultrasonic data of nanoporous materials without using effective medium theories: pore sizes and pressure-dependence of elastic moduli.** *Rolf Pelster; Klaus Schappert*
11:46	[294] **Long-term deformation rate of sealed concrete samples as a viscous response of the material to capillary forces.** *Abudushalamu Aili; Matthieu Vandamme; Jean-Michel Torrenti; Benoit Masson*
12:04	[306] **Nanoimbibition in Artificial Opals –a Photonic Approach for Nanoporous Media.** *Francisco Gallego-Gomez; Cefe Lopez*
12:22	[121] **Liquid-Infused Nanoporous Solids as Photonic Metamaterials** *Kathrin Sentker; Mark Busch; Andriy Kityk; Patrick Huber*

Thursday Detailed Program

Must See sight: Plaza del Ayuntamiento (town hall)

Oral presentations: Parallel sessions 11

MS 18: Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers. - Part 1
*Multipurpose room 1 - **Chairs:** Christos Tsakiroglou; Olga Vizika Kavvadias*

14:00	[123] **Innovative tools for field scale interpretation of attenuation processes and quantification of contaminant mass discharge at the groundwater-surface water interface.** *Poul L. Bjerg; Vinni Ronde; Nicola Balbarini; Majken Frederiksen; Anne Sonne; Frederick Devlin; MacKenzie Cremeans; Mike Annable; Philip Binning; Ursula McKnight*
14:18	[552] **Industrial gas storage monitoring based on measurement of soil respiration model.** *Guillaume Berthe; Ricardo Huerta; Abdelaziz Faraj; Virgile Rouchon; Bruno Garcia*
14:36	[563] **Numerical and experimental immiscible two-phase flow under non-isothermal conditions: application to thermally enhanced DNAPLs recovery.** *Hossein Davarzani; Malorie Dierick; Manuel Marcoux; Nicolas Philippe; Pierre -Yves Klein; Stefan Colombano*
14:54	[57] **Pilot scale "in pile" thermal desorption remediation of mercury and mixed pesticides contaminated soil.** *Soren Eriksen; Jocob Brix; Jesper Holm*
15:12	[721] **Laboratory Investigation of Infiltration of Non-Newtonian Fluids through Cold Porous Media for Effective Remediation of Adsorbed Contaminants.** *Fawad Naseer; Debasmita Misra; Majdi Abou Najm; Obadare Awoleke*

MS 14: Uncertainty Quantification in Porous Media - Part 2
*Auditorium 3A - **Chairs:** Arunasalam Rahunanthan, Felipe Pereira*

14:00	[201] **The Multiscale Robin Coupled Method for two-phase flows in porous media.** *Franciane Rocha; Fabricio Sousa; Roberto Ausas; Gustavo Buscaglia; Felipe Pereira*
14:18	[764] **Data Assimilation Based on Ensemble Kalman Filters Using KL-Expansion and Stochastic Variable Transformation.** *Michael Liem; Patrick Jenny*
14:36	[296] **Multiscale characterization of effective conductivity of random heterogeneous porous media: multiple versus single realization approaches.** *Ivan Colecchio; Benoit Noetinger; Alejandro Boschan; Alejandro Otero*

Oral presentations: Parallel sessions 11 *(cont.)*

MS 14: Uncertainty Quantification in Porous Media - Part 2 *(cont.)*
*Auditorium 3A - **Chairs:** Arunasalam Rahunanthan, Felipe Pereira*

14:54   [184] **Bayesian validation of a coupled porous medium/Free-flow model using adaptive arbitrary polynomial chaos expansion.**
Farid Mohammadi; Bernd Flemisch

15:12   [237] **Moment-based Metrics for Global Sensitivity for multiple Models with Uncertain Parameters.**
Aronne Dell'Oca; Alberto Guadagnini; Monica Riva

MS 3: Flow, transport and mechanics in fractured porous media - Part 8
*Auditorium 3B - **Chairs:** Stefano Berrone, Hamid Nick*

14:00   [311] **Accuracy of Hydraulic Rock Properties derived from X-ray-Tomographic Images – Insights from Laboratory Experiments on Porous and Fractured Rocks.**
Mathias Nehler; Ferdinand Stockhert; Mandy Duda; Erik Saenger; Jorg Renner; Rolf Bracke

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14:18   [412] **Extensions of poromechanical dual-continuum models for anisotropic elastic properties.**
Mark Ashworth; Florian Doster

14:36   [692] **3D printing application for flow and mechanical deformation in a single fracture network.**
Hongkyu Yoon; Mario J. Martinez; J. Eric Bower; Alec Kucala

14:54   [252] **Production Forecasting of Horizontal Wells with Acid Etching Hole Completion in Unconventional Reservoirs.**
Juntai Shi; Xuechen You; Jinhui Fang; Ming Lv; Yanran Jia; Zheng Sun

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15:12   [576] **A New Method for Analysis of Nano-Scale Dual-Pore-Shape Pore Size Distributions in shale and its application.**
Jianwu Liu; Detang Lu

Thursday Detailed Program

THURSDAY, 9 MAY 2019

Oral presentations: Parallel sessions 11 *(cont.)*

MS 8: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - Part 6
*Room 3 - **Chairs:** Marco Dentz, Branko Bijeljic*

14:00	[829] **A General, Data-Driven Dispersion Model for Stochastic Transport in Heterogeneous Media.** *Ranit Monga; Oliver Brenner; Daniel Meyer; Patrick Jenny*
14:18	[114] **Ballisticules, mobile-mobile mass exchange, and mixing-limited reactions.** *Timothy Ginn; Deviyani Gurung*
14:36	[129] **Anomalous Reaction--Diffusion under Quenched Heterogeneity.** *Tomas Aquino; John Lapeyre; Marco Dentz*
14:54	[340] **A Lagrangian Model of Mixing-Limited Reactive Transport.** *Guillem Sole-Mari; Diogo Bolster; Daniel Fernandez-Garcia; Xavier Sanchez-Vila*
15:12	[17] **Balancing complexity and parsimony to accurately model, and upscale, the transport of large, fibrous colloids through porous media.** *Nick Engdahl*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 7
*Room 1 - **Chairs:** Sorin Pop, Paolo Zunino*

14:00	[474] **Operator-based linearization method for modelling of multiphase flow with buoyancy and capillarity.** *Xiaocong Lyu; Mark Khait; Denis Voskov*
14:18	[649] **A versatile model for mass transport abnormalities applicable to molecular displacements complemented by tracer test.** *Marie-Christine Neel; Marc Fleury; Daniela Bauer*
14:36	[686] **Behavior of turbulence at Fluid/Porous interfaces of different Permeabilities.** *Mahmoud Elhalwagy; Anthony Gerald Straatman*
14:54	[810] **Coupled CFD-DEM modelling of granular porous media under shear: implications for dynamics of faults with granular gouge.** *Omid Dorostkar; Jan Carmeliet*
15:12	[868] **Modeling dynamic particle filtration processes using coupled pore-to-continuum multiscale modeling.** *John Blears; Karsten Thompson*

Oral presentations: Parallel sessions 11 *(cont.)*

MS 11: Microfluidics in porous systems - Part 5
*Room 2 - **Chairs:** Pietro de Anna, Vahid Niasar, Hassan Mahani*

14:00 [854] **Experimental observations of coupling of free flow and non-uniform porous structures in a microfluidic setup.**
Matthijs de Winter; Kilian Weishaupt; Majid Hassanizadeh; Rainer Helmig

14:18 [315] **Studying the generation of nanoparticle-stabilized foam at pore scale.**
Qingjian Li; Valentina Prigiobbe

14:36 [463] **Dynamics of Capillarity-Driven Water Invasion into Mixed-Wet Angular Pores.**
Ahmed M. Saad; Maxim Yutkin; Tadeusz Patzek

14:54 [233] **Solute mixing in porous media: the role of confinement.**
Mayumi Hamada; Pietro De Anna

15:12 [608] **Study of contact angle variation considering geological CO2 sequestartion.**
Jongwon Jung; Mohammad Jafari

MS 13: Fluids in Nanoporous Media - Part 5
*Room 6 - **Chairs:** Gennady Gor, Patrick Huber*

14:00 [632] **Controlling the mechanics of nanoporous metals by adsorption and superficial electric charging**
Jorg Weissmuller

14:18 [54] **Pressure inside a nano-porous medium. The case of a single phase fluid.**
Olav Galteland; Dick Bedeaux; Signe Kjelstrup; Bjorn Hafskjold

14:36 [860] **Effects of gas adsorption-induced deformation on carbon dioxide storage in coal.**
Mojgan Hadi Mosleh

14:54 [588] **Atomistic Simulation of the Adsorption and Transport of Naturally Occurring Radioactive Materials in Clay Nanopores in the Context of Shale Gas Exploration.**
Andrey G. Kalinichev; Brice F. Ngouana-Wakou; Iuliia Androniuk

15:12 [546] **The effect of water adsorption on deformation and elastic properties of Bentheim sandstone.**
Alexey Yurikov; Maxim Lebedev; Gennady Gor; Boris Gurevich

THURSDAY, 9 MAY 2019

3-minute pitch presentations: Parallel sessions 3

15:35 [37] **Cross pumping test to characterize the heterogeneity of hydraulic properties of a contaminated aquifer.**
Theo De Clercq

15:38 [307] **Bringing techniques from soil science to contaminated sites.**
Juliana Freitas

15:41 [319] **Modeling nanoparticle transport in porous media in the presence of a foam.**
Qingjian Li

15:44 [540] **Multiphase Flow Modeling for the Estimation of the Interphase Mass Transfer of Enhanced DNAPL Solubilization.**
Nadim Copty

15:47 [578] **Green synthesis of nZVI suspensions from plant extracts for in situ remediation of polluted groundwater.**
Christos Tsakiroglou

15:50 [600] **Reactive transport simulations throughout the continuum "Unsaturated – Saturated Zones" of a complex multiphase system using the O-ZNS platform.**
Mohamed Azaroual

15:53 [657] **Application of Yield Stress fluids porosimetry Method and pore-network modelling to characterize the pore size distribution of packs of spherical beads.**
Antonio Rodriguez de Castro

15:56 [698] **Mobility of zero-valent iron nanoparticles in porous media - A study using X-ray computed micro-tomography.**
Nathaly Lopes Archilha

15:59 [978] **Correlations between cross-over and critical flow conditions for steady-state two-phase flows in porous media.**
Marios Valavanides

16:02 [923] **Modelling of bone-cement-injection processes in cancellous vertebral bones.**
Zubin Trivedi

16:05 [926] **Emptying of mesoporous materials: direct evidence for cavitation.**
Etienne Rolley

16:08 [939] **Multiscale Image Based Modelling of Plant-Soil Interaction.**
Tiina Roose

16:11 [862] **Stability and transport behavior of DNA-tagged silica particle tracers in undisturbed laboratory soil column experiments.**
Bahareh Kianfar

3-minute pitch presentations: Parallel sessions 3 *(cont.)*

*Auditorium 3A - **Chairs:** Matteo Cusini; Jens Eller*

15:35 [163] **Fractal analysis of gas relative diffusion coefficient in porous nanofibers with rough surfaces.**
Qian Zheng

15:38 [210] **A dynamic simulator for gas diffusion and surface adsorption-desorption in fractured coal.**
Xu Yu

15:41 [487] **Supershear rupture promoted by poroelastic coupling in induced earthquakes.**
Pedro Pampillon Alonso de Velasco

15:44 [525] **NMR Experimental Study of CO2 Huff-Puff Characteristics on Matrix and Fractured Tight Sand Based on Four-Pore Model.**
Yuli Sun

15:47 [603] **Research on Non-linear Porous Seepage Model of Multi-Fractured Horizontal Well in Shale Gas Reservoir.**
Qiang Wang

15:50 [677] **Analytical and Numerical Assessment of Hydraulic Properties of 3D Partially Open Fractures with Variable Roughness.**
Xupeng He

15:53 [735] **Simulation of Flow and Transport in Microfractures using Discrete Fracture Network Approach.**
Nataliia Makedonska

15:56 [760] **Fluid-solid interaction during particle aggregates drying.**
Abdolreza Kharaghani

15:59 [773] **Exploring the Robustness of Terahertz-Based Porosity Measurements using Embossed and Unembossed Pharmaceutical Tablets.**
Prince Bawuah

16:02 [880] **Numerical study on the mechanism of fluid flow through thin rough fractures.**
Ge Zhang

16:05 [940] **Mixing by dispersion in heterogeneous porous medium.**
Chunendra K. Sahu

16:08 [185] **A Mixed-dimensional Discontinuous Galerkin Method for Coupled Flow and Transport in Fractured Porous Media.**
Teeratorn Kadeethum

16:11 [545] **The influence of fracture on the gas reservoir development.**
Chunyan Jiao

Thursday Detailed Program

THURSDAY, 9 MAY 2019

3-minute pitch presentations: Parallel sessions 3 *(cont.)*

*Auditorium 3A - **Chairs:** Matteo Cusini; Jens Eller*

16:14 [174] **An research and application of yield variation law of fractured wells in tight oil straight well：A case of the Daqing Oilfield, China.**
Wenming Wang

16:17 [45] **Precisely Studies on Petrophysical Parameters and Interface Properties of Cores from Tight Oil Reservoirs.**
Yutian Luo

*Auditorium 3B - **Chairs:** Brian Ellis; Sadaf Sobhani*

15:35 [183] **Filtration by porous media: the role of flow disorder.**
Filippo Miele

15:38 [190] **A semi-analytical interpretation model of pulse decay measurements on ultra-tight rocks.**
Yue Wang

15:41 [285] **About the Use of 3D Printed Micromodels to Investigate single- and two-phase Flow Processes.**
Alexandros Patsoukis Dimou

15:44 [329] **Impact of disorder on flows and transport in porous media.**
Thomas Darwent

15:47 [374] **Application of numerical modelling and flow experiments to optimize the design of microfluidic devices representing porous media.**
Amir Jahanbakhsh

15:50 [394] **Interfacial curvature, contact angle and capillary pressure measurements during drainage process in micromodels.**
Farzan Kazemifar

15:53 [406] **Pore scale effects of electrical charge in porous media under electrical and mechanically driven flows.**
Omar Emmanuel Godinez Brizuela

15:56 [645] **Microscopic investigation of polymer flow in porous media.**
Pegah Shakeri

15:59 [928] **Experimental Analysis and Mathematical Modelling of Inorganic Scaling in Seawater Reverse Osmosis Membranes.**
Omomayowa Akele

16:02 [930] **A Digital Image Correlation Analysis on the Rapid Reduction Mechanism of Permeability in Low-Permeability Sandstone Reservoirs.**
Jing Yang

16:05 [942] **Efficient DG-based simulation of coupled surface subsurface flow.**
Dmitry Mazilkin

16:08 [983] **A Multiphase Extension of Darcy's Law with Non-Local Support.**
Saman Aryana

3-minute pitch presentations: Parallel sessions 3 *(cont.)*

Room 3 - **Chairs:** *Hongkyu Yoon; Cyprien Soulaine*

15:35   [217] **The analysis of the effect of ethane fraction on the carbon dioxide displacement in coal using molecular simulation.**
Jiawei Li

15:38   [346] **Molecular dynamics simulation of ink imbibition in porous media.**
Ahmed Jarray

15:41   [489] **Understanding fluid transport through hardened cement paste from 3D image observation.**
Yang Song

15:44   [815] **Experimental Investigations of Nanopore Adsorption Measurement by Low-field Nuclear Magnetic Resonance.**
Taojie Lu

15:47   [895] **Thermal analysis and design optimization of multi-layer insulation with fiber-reinforced aerogel and reflective screen.**
Jiangfeng Guo

15:50   [896] **Two-dimensional flows in fluid coupled with porous medium.**
Kirill Tsiberkin

15:53   [898] **Foam flow and its blocking effect in high permeable saturated porous media.**
Romain Aranda

15:56   [933] **Modeling of transport, accumulation and replication of bacteria in porous media.**
Kartik Jain

15:59   [934] **Cut, overlap and locate: 3D localization of highly overlapping tracer particles in defocal microscope images.**
Simon Franchini

16:02   [943] **Gas flows in nano channels: coupling molecular dynamics to a kinetic method.**
Qiang Sheng

16:05   [517] **Shale Oil Transport through Nano Slit of Kerogen by Molecular Dynamic Simulation.**
Yongfei Yang

16:08   [822] **Modeling the effect of time-dependent wettability modification in modified salinity water flooding.**
Mirhossein Taheri

16:11   [115] **Dynamic Formation Damage in Porous Media induced by Particle Transport.**
Jessie Chen

Thursday Detailed Program

Poster exhibition: Session 3

Poster board	Exhibition Hall
1	[37] **Cross pumping test to characterize the heterogeneity of hydraulic properties of a contaminated aquifer.** *Theo De Clercq; Abderrahim Jardani; Laurent Thannberger*
2	[307] **Bringing techniques from soil science to contaminated sites.** *Juliana Freitas; Sheila Furquim; Mirian Shinzato; Miguel Cooper; Everton Oliveira; Mariana Favero; Ellen Leite; Fabio Minzon; Thomas Bodelao*
3	[319] **Modeling nanoparticle transport in porous media in the presence of a foam.** *Qingjian Li; Valentina Prigiobbe*
4	[540] **Multiphase Flow Modeling for the Estimation of the Interphase Mass Transfer of Enhanced DNAPL Solubilization.** *Aybike Gul Karaoglu; Nadim Copty; Nihat Hakan Akyol; Seda Aslan Kilavuz; Masoud Babaei*
5	[578] **Green synthesis of nZVI suspensions from plant extracts for in situ remediation of polluted groundwater.** *Christos Tsakiroglou; Mihalis Karavasilis*
6	[600] **Reactive transport simulations throughout the continuum "Unsaturated – Saturated Zones" of a complex multiphase system using the O-ZNS platform.** *Mohamed Azaroual; Arnaud Isch; Clara Jodry; Marion Klintzing; Carlos Aldana*
7	[657] **Application of Yield Stress fluids porosimetry Method and pore-network modelling to characterize the pore size distribution of packs of spherical beads.** *Antonio Rodriguez de Castro; Mehrez Agnaou; Azita Ahmadi-Senichault; Abdelaziz Omari*
8	[698] **Mobility of zero-valent iron nanoparticles in porous media - A study using X-ray computed micro-tomography.** *Tannaz Pak; Luiz Fernando de Lima Luz Jr; Nathaly Lopes Archilha; Gabriel Schubert Ruiz Costa; Tiziana Tosco*
9	[978] **Correlations between cross-over and critical flow conditions for steady-state two-phase flows in porous media.** *Marios Valavanides; Alexandros Morfopoulos*
10	[923] **Modelling of bone-cement-injection processes in cancellous vertebral bones.** *Zubin Trivedi; Christian Bleiler; Arndt Wagner; Oliver Rohrle*

Poster board	Exhibition Hall
11	[926] **Emptying of mesoporous materials: direct evidence for cavitation.** *Etienne Rolley; Victor Doebele; Fabien Souris; Laurent Cagnon; Panayotis Spathis; Pierre-Eienne Wolf; Annie Grosman; Isabelle Trimaille*
12	[939] **Multiscale Image Based Modelling of Plant-Soil Interaction.** *Tiina Roose*
13	[144] **An efficient control volume finite element method for multi-phase flow in fractured porous media.** *Hossam Osman; Pablo Salinas; Christopher C. Pain; Matthew D. Jackson*
14	[156] **Dynamics and reversibility of tracer dispersion in time dependent flows inside rough fractures.** *Yanina Lucrecia Roht; Ricardo Chertcoff; Jean-Pierre Hulin; Harold Auradou; Irene Ippolito*
15	[163] **Fractal analysis of gas relative diffusion coefficient in porous nanofibers with rough surfaces.** *Qian Zheng*
16	[210] **A dynamic simulator for gas diffusion and surface adsorption-desorption in fractured coal.** *Xu Yu; Klaus Regenauer-Lieb*
17	[476] **The impact of fracture slip on the fracture contact pressure.** *Rafael March; Florian Doster*
18	[487] **Supershear rupture promoted by poroelastic coupling in induced earthquakes.** *Pedro Pampillon Alonso de Velasco; Luis Cueto-Felgueroso ; David Santillan Sanchez; Juan Carlos Mosquera Feijoo*
19	[525] **NMR Experimental Study of CO2 Huff-Puff Characteristics on Matrix and Fractured Tight Sand Based on Four-Pore Model.** *Yuli Sun; Xu Dong; Dongxing Du*
20	[603] **Research on Non-linear Porous Seepage Model of Multi-Fractured Horizontal Well in Shale Gas Reservoir.** *Qiang Wang*
21	[677] **Analytical and Numerical Assessment of Hydraulic Properties of 3D Partially Open Fractures with Variable Roughness.** *Xupeng He; Hussein Hoteit*
22	[735] **Simulation of Flow and Transport in Microfractures using Discrete Fracture Network Approach.** *Nataliia Makedonska; Satish Karra; Hari Viswanathan*

Thursday Detailed Program

THURSDAY, 9 MAY 2019

Poster exhibition: Session 3 *(cont.)*

Poster board	Exhibition Hall
23	[760] **Fluid-solid interaction during particle aggregates drying.** *Abdolreza Kharaghani; Son Thai Pham Bruno Chareyre; Evangelos Tsotsas*
24	[773] **Exploring the Robustness of Terahertz-Based Porosity Measurements using Embossed and Unembossed Pharmaceutical Tablets.** *Prince Bawuah; Alessia Portieri; Daniel Markl; Daniel Farrell; J. Axel Zeitler; Mike Evans; Ralph Lucas*
25	[826] **Impact of Heterogeneous Fracture Aperture on the Well Productivity of Deformable Fractured Porous Media.** *Teeratorn Kadeethum; H. M. Nick; S. Salimzadeh; S. Seyum*
26	[880] **Numerical study on the mechanism of fluid flow through thin rough fractures.** *Ge Zhang*
27	[940] **Mixing by dispersion in heterogeneous porous medium.** *Chunendra K. Sahu; Mike J. Bickle; Jerome A. Neufeld*
28	[955] **Plug formation of a ferromagnetic and glass beads mix.** *Louison Thorens; Knut Jorgen Maloy; Mickael Bourgoin; Stephane Santucci*
29	[183] **Filtration by porous media: the role of flow disorder.** *Filippo Miele; Pietro De Anna; Marco Dentz; Herve Tabuteau*
30	[190] **A semi-analytical interpretation model of pulse decay measurements on ultra-tight rocks.** *Yue Wang; Steffen Nolte; Garri Gaus; Alexandra Amann-Hildenbrand; Bernhard M. Krooss; Moran Wang*
31	[285] **About the Use of 3D Printed Micromodels to Investigate single- and two-phase Flow Processes.** *Alexandros Patsoukis Dimou; Julien Maes; Mohamed Arab; Sebastian Geiger; Thomas McGravie*
32	[329] **Impact of disorder on flows and transport in porous media.** *Thomas Darwent; Felix Meigel; Karen Alim; Lucas Goehring*
33	[349] **Drying and percolation in correlated porous media.** *Soumyajyoti Biswas; Paolo Fantinel; Oshri Borgman; Ran Holtzman; Lucas Goehring*
34	[374] **Application of numerical modelling and flow experiments to optimize the design of microfluidic devices representing porous media.** *Amir Jahanbakhsh; Omid Shahrokhi; Rumbidzai A. E. Nhunduru; Krystian L. Wlodarczyk; Duncan P. Hand; M. Mercedes Maroto-Valer*

Poster exhibition: Session 3 *(cont.)*

Poster board	Exhibition Hall
35	[394] **Interfacial curvature, contact angle and capillary pressure measurements during drainage process in micromodels.** *Farzan Kazemifar; Yaofa Li; Gianluca Blois; Kenneth Christensen*
36	[406] **Pore scale effects of electrical charge in porous media under electrical and mechanically driven flows.** *Omar Emmanuel Godinez Brizuela; Vahid.J Niasar*
37	[621] **Microbial growth in confined flows: the role of physical heterogeneity.** *Camille Kerboas; Pietro De Anna; Stephane Mahe; Mayumi Hamada*
38	[622] **A numerical and experimental study of drainage processes in predominantly 2D microfluidic porous domains.** *Andreas Yiotis; Nikolaos Karadimitriou; Ioannis Zarikos; Holger Steeb*
39	[644] **Monitoring Pressure Fluctuations in Artificial Porous Media.** *Michael JungMartin Brinkmann; Stephan Herminghaus; Ralf Seemann*
40	[645] **Microscopic investigation of polymer flow in porous media.** *Pegah Shakeri; Michael Jung; Martin Brinkmann; Stephan Herminghaus; Ralf Seemann*
41	[687] **Impact of particle size correlation on immiscible fluid displacement in porous media.** *Thomas Darwent; Oshri Borgman; Enrico Segre; Ran Holtzman; Lucas Goehring*
42	[731] **Characterization of Foam Flow in Porous Media: Effect of Different Chemical Concentrations, Flow Rates and GLR Ratio.** *Sahand Etemad; Apostolos Kantzas; Steven Bryant*
43	[786] **Phase diagram of quasi-static immiscible displacement in disordered porous media.** *Tian Lan; Guanju Wei; Ran Hu; Yi-Feng Chen*
44	[791] **Understanding Mixing and Reaction at Rough Fracture Intersections.** *Sanghyun Lee; Peter Kang*
45	[867] **Pore-Scale Flow of Water and Supercritical CO2 in 2D Porous Micromodels: High-Speed Quantifications of Velocity Fields and Interface Dynamics at Reservoir Conditions.** *Yaofa Li; Farzan Kazemifar; Gianluca Blois; Kenneth Christensen; Yu Chen; Amir Kohanpur; Albert Valocchi*
46	[928] **Experimental Analysis and Mathematical Modelling of Inorganic Scaling in Seawater Reverse Osmosis Membranes.** *Omomayowa Akele*

Thursday Detailed Program

Poster exhibition: Session 3 *(cont.)*

Poster board	Exhibition Hall
47	[930] **A Digital Image Correlation Analysis on the Rapid Reduction Mechanism of Permeability in Low-Permeability Sandstone Reservoirs.** *Jing Yang; Jianwen Ye; Yao Li*
48	[942] **Efficient DG-based simulation of coupled surface subsurface flow.** *Dmitry Mazilkin; Peter Bastian; Dominic Kempf; Olaf Ippisch*
49	[217] **The analysis of the effect of ethane fraction on the carbon dioxide displacement in coal using molecular simulation.** *Jiawei Li; Yuzhu Wang; Zhixi Chen; Sheik Rahman*
50	[327] **Apparent Permeability of Gas Shales – Caution when comparing simulation results with experimental data.** *Steffen Nolte; Reinhard Fink; Bernhard M. Krooss; Alexandra Amann-Hildenbrand*
51	[346] **Molecular dynamics simulation of ink imbibition in porous media.** *Ahmed Jarray; Wouter K. den Otter; Stefan Luding*
52	[483] **Transport Properties Of Fluids In Kerogen Membranes.** *Patrick Bonnaud; Fouad Oulebsir; Romain Vermorel; Julien Collell; Francois Gelin; Eric Chaput; Guillaume Galliero*
53	[489] **Understanding fluid transport through hardened cement paste from 3D image observation.** *Yang Song*
54	[570] **Electrosorption in Polypyrrole-Silicon Hybrid Nanopores: Insights from Cyclic Voltammetry and Dilatometry.** *Manuel Brinker; Guido Dittrich; Pirmin Lakner; Thomas Keller; Patrick Huber*
55	[703] **Adsorption-induced deformation in mesoporous materials: comparison between pore-load modulus and Young's modulus.** *Jerome Loizillon; David Grosso*
56	[815] **Experimental Investigations of Nanopore Adsorption Measurement by Low-field Nuclear Magnetic Resonance.** *Peixue Jiang; Ruina Xu; Taojie Lu*
57	[895] **Thermal analysis and design optimization of multi-layer insulation with fiber-reinforced aerogel and reflective screen.** *Jiangfeng Guo; Guihua Tang; Jian Feng; Bo Fu; Yuan Ma*
58	[896] **Two-dimensional flows in fluid coupled with porous medium.** *Kirill Tsiberkin; Irina Tyulkina*

Poster board	Exhibition Hall
59	[898] **Foam flow and its blocking effect in high permeable saturated porous media.** *Romain Aranda; Hossein Davarzani; Fabien Laurent; Henri Bertin*
60	[933] **Modeling of transport, accumulation and replication of bacteria in porous media.** *Kartik Jain; Christian Holm*
61	[933] **Modeling of transport, accumulation and replication of bacteria in porous media.** *Kartik Jain; Christian Holm*
62	[934] **Cut, overlap and locate: 3D localization of highly overlapping tracer particles in defocal microscope images.** *Simon Franchini; Sam Krevor*
63	[943] **Gas flows in nano channels: coupling molecular dynamics to a kinetic method.** *Qiang Sheng; Minh-Tuan Ho; Jun Li; Matthew Borg; Yonghao Zhang; Jason Reese*
64	[888] **non-Gaussian multi-scale heterogeneity patterns of equivalent conductivities of a fractured reservoir.** *Alberto Guadagnini; Monica Riva; Siena Martina; Monica Papini; Laura Longoni; Scesi Laura*
65	[952] **Phase-field method vs. volume of fluid (VOF) for simulating immiscible two-phase flow in porous media.** *Taofik Nassan; Mohammad Amro*
66	[962] **Voxels agglomeration for a fast permeability estimation on micro-CT images.** *Traiwit Chung*
67	[965] **"Hot Spots" observed in pore scale simulation of flow in carbon fibre felt electrodes limits the efficiency of Redox Flow Battery operation.** *Edo Boek; Rhodri Jervis; Farrel Gray*
68	[968] **Joint identification of contaminant source and non-Guassian conductivities via the restart normal-score Ensemble Kalman filter.** *Zi Chen; Jaime Gomez; Teng Xu; Andrea Zanini*
69	[969] **Stochastic upscaling for hydraulic conductivity based on laboratory experiments.** *Vanessa A. Godoy; Lazaro V. Zuquette; Jaime Gomez-Hernandez*

Thursday Detailed Program

Poster exhibition: Session 3 *(cont.)*

Poster board	Exhibition Hall
70	[971] **Permeation and separation of CH4/CO2 mixtures through single-layer nanoporous graphene membranes : theory and molecular simulations.** *Juncheng Guo; Romain Vermorel; Guillaume Galliero*
71	[822] **Modeling the effect of time-dependent wettability modification in modified salinity water flooding.** *Mirhossein Taheri; H. M. Nick; Ali Akbar Eftekhari; Maria Bonto*
72	[976] **Modeling Mass Transport in Porous Transport Layers of PEM Water Electrolysis Cells.** *Gergely Schmidt; Michel Suermann; Boris Bensmann; Richard Hanke-Rauschenbach; Insa Neuweiler*
73	[83] **Enhanced Thermal Recovery Mechanism of CO2 - Assisted Steam.** *Zhengxiao Xu; Zhaomin Li; Teng Lu; Mingxuan Wu*
74	[219] **Prediction of the Effective Thermal Conductivity of the Porous Media based on Digitally Reconstructed Matrix Structures.** *Dongxing Du; Xu Zhang; Fei Wang; Xu Dong; Zhifeng Sun; Yingge Li*
75	[661] **Thermal conductivity of partially sintered oxide ceramics predicted via cross-property relations and measured via laser flash.** *Eva Gregorova; Willi Pabst; Vojtech Necina; Tereza Uhlirova*
76	[665] **Pore shape influence on the thermal conductivity of porous ceramics and sedimentary rocks with empty, water-saturated or high-conductivity pore space.** *Willi Pabst; Eva Gregorova; Tereza Uhlirova; Vojtech Necina*
77	[115] **Dynamic Formation Damage in Porous Media induced by Particle Transport.** *Jessie Chen*
78	[774] **Modeling of transport phenomena and pollutant degradation during DBD discharge used for soil remediation.** *Nadia Bali; Christos Aggelopoulos; Skouras Eugene; Christos Tsakiroglou; Vasilis Burganos*
79	[589] **Atomistic Computational Modeling of Fluid Transport in Cement Nanopores in the Context of Geological CO2 Sequestration.** *Sylvia M. Mutisya; Andrey Kalinichev*
80	[185] **A Mixed-dimensional Discontinuous Galerkin Method for Coupled Flow and Transport in Fractured Porous Media.** *Teeratorn Kadeethum; H. M. Nick; S. Salimzadeh; C. N. Richardson; F. Ballarin; S. Lee*

Thursday Detailed Program

Poster board	Exhibition Hall
81	[883] **Changes in Porous Media Properties by Modeling Dissolution and Morphological Transformations in Micro-CT Images.** *Juan Pablo Daza; Gerald Mavko; Amos Nur*
82	[983] **A Multiphase Extension of Darcy's Law with Non-Local Support.** *Saman Aryana; Yuhang Wang*
83	[746] ***Cancelled***
84	[862] **Stability and transport behavior of DNA-tagged silica particle tracers in undisturbed laboratory soil column experiments.** *Bahareh Kianfar; Jan Willem Foppen; Bas Van der Zaan; Joachim Rozemeijer; Thom Bogaard*
85	[212] **Research and Application of Numerical Method of Evaluation of Fracturing Effects in Large Scale Volume Reform of Vertical Wells.** *Zhengming Yang; Anshun Zhang; Debin Xia; Yapu Zhang; Yutian Luo*
86	[900] **A New Method to Predict the Performance in Gas Assisted Gravity Drainage Using Dimensionless Groups.** *Kewen Feng*
87	[517] **Shale Oil Transport through Nano Slit of Kerogen by Molecular Dynamic Simulation.** *JIe Liu; Yongfei Yang; Jun Yao*
88	[545] **The influence of fracture on the gas reservoir development.** *Chunyan Jiao; Yong Hu; Xuan Xu*
89	[174] **An research and application of yield variation law of fractured wells in tight oil straight well：A case of the Daqing Oilfield, China.** *Wenming Wang; Lei Ren; Zhengming Yang, Xinli Zhao, Ting Chen, Yutian Luo*
90	[45] **Precisely Studies on Petrophysical Parameters and Interface Properties of Cores from Tight Oil Reservoirs.** *Yutian Luo; Zhengming Yang, Yapu Zhang*
91	[977] **A Multi-instrument Approach to the Characterisation of Irradiated and Virgin Nuclear Graphite.** *Ben Veater; Giuliano Maurizio Laudone; Katie Louise Jones; Natasha Stephen*
92	[847] **Impact of Physical Heterogeneity on Multispecies Reactive Transport in a Microporous Carbonate.** *Thomas David Serafini de Oliveira; Martin Blunt; Branko Bijeljic*
93	[242] **Saturation-Dependence of Non-Fickian Transport in Porous Media.** *Sharul Nizam Hasan; Vahid.J Niasar; Nikolaos Karadimitriou; Muhammad Sahimi*

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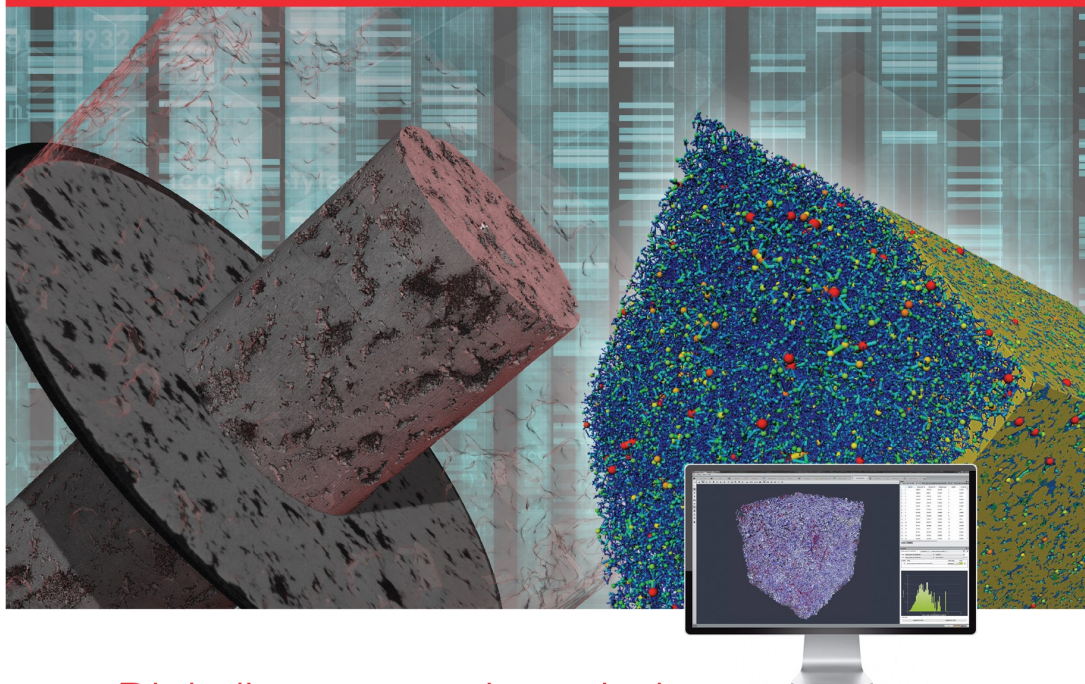- Countries Where Our Brands Are Sold: 180+
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- Innovation work covers product research, product development, process development and manufacturing capability, packaging development, analytical & microbiology, product safety & regulatory affairs, etc.
- If you are interested to career opportunities in P&G R&D, please visit http://germany-austria.pgcareers.com/ for more information and online application.

Invited Speakers: Session 3

Prof. Amilcare Porporato

Princeton University
Auditorium 2 - 08:45
Chair: *Pablo A. Garcia-Salaberri*

Ecohydrology: interactions of life and water around a porous medium.

As a quintessential example of porous media, soils act as complex filters of hydroclimatic forcing, giving rise to moisture variability at different spatial and temporal scales. These dynamics exert strong controls on vegetation and soil microbial life and in turn feed back on meteorological and hydroclimatic conditions, thus propagating to larger scales with profound impacts on ecosystems and society.

We discuss upscaling of such processes in a way that preserves the essential nonlinearities, originating from pore-scale processes in the soil and plant tissues, while surrogating high-dimensional hydroclimatic variability by means of probabilistic components. The resulting description offers useful simplifications for ecohydrological, biogeochemical, geomorphological and climatic analysis and allows us to integrate from daily to decadal timescales and beyond to address problems related to land-use and water resources planning. We discuss examples related to plant water stress and plant productivity as well as soil carbon and nutrient dynamics. The challenges for rigorous upscaling and coupling of ecohydrological processes in soils offer a unique opportunity for the scientific community to contribute to the pressing need of using soil and water resources in sustainable way.

Prof. Jan Dirk Jansen
Delft University of Technology
Auditorium 3A - 08:45
Chair: *Karsten Thompson*

Systems and control theory for flow and deformation in porous media.

The past 15 years saw an increasing use of large-scale numerical models to perform model-based optimization of subsurface flow in combination with data assimilation to keep the models evergreen, a workflow sometimes referred to as "closed-loop reservoir management". My talk will address some of the key computational elements and the underlying system-theoretical concepts such as observability and controllability of state variables, identifiability of parameters, and their relation with low-dimensional representations (model-order reduction). Most of the applications concern multi-phase flow of oil, gas and water through porous media with some excursions into the potential to use system-theoretical concepts for the control of poro-mechanical subsurface behavior, for example for hydraulic fracturing or induced seismicity.

Invited Speakers: Session 3 *(cont.)*

Prof. Charles Werth

UT Austin
Auditorium 3B - 08:45
Chair: *Steven Jansen*

Microbial processes that allow pollutant biodegradation in toxic and inaccessible micro-environments within porous media.

Pollutants and metal oxides sequestered deep within narrow pores too small for cell access, and in toxic microenvironments deemed inhabitable, are often thought to be inaccessible to microbial degradation. However, dissimilatory metal reducing bacteria have evolved the capacity for extracellular electron transfer. In this presentation, I show results demonstrating diffusion based electron shuttling between the bacterium Shewanella oneidensis MR-1 and a metal oxide across a physical separation created by a nanoporous barrier in a microfluidic reactor. Real-time quantification of electron flux across this barrier by MR-1 strains with different electron transfer capabilities revealed that this bacterium exports flavins to its surroundings when faced with no direct physical access to an electron acceptor, allowing it to reduce metals via diffusion at distances exceeding 60 microns. An energy balance indicates flavins must be recycled for S. oneidensis MR-1 to yield energy from lactate oxidation coupled to flavin reduction. Both experimental and modeling results indicate that flavins are recycled at least 24 times, depending on flow conditions. This energy saving strategy, which until now had not been systematically tested or captured in environmentally relevant systems, suggests that electron shuttling microorganisms have the capacity promote bioremediation in physically distant or potentially toxic microenvironments.

Invited Speakers: Session 3 *(cont.)*

Dr. Carmen Rodrigo Cardiel

University of Zaragoza
Room 3 - 08:45
Chair: *Massimiliano Ferronato*

Robust discretizations for fluid-flow problems in deformable porous media.

The numerical simulation of the coupling between mechanical deformation and fluid flow in porous media has become of increasing importance due to the wide application of these models in different fields ranging from geomechanics and petroleum engineering, to biomechanics. The governing systems of partial differential equations of poroelastic models involve parameters which typically vary over several orders of magnitude from one application to another, making its stable discretization and efficient solution a challenging task. Robust discretizations with respect to all the physical parameters are needed for this type of problems to obtain reliable numerical solutions. This is a very important task, and some efforts are being carried out in this address by the scientific community.

In this talk, we discuss about stable discretizations for poroelastic problems, for which stability estimates uniformly independent on the physical and discretization parameters are derived.

FRIDAY, 10 MAY 2019

Oral presentations: Parallel sessions 12

Must See sight: Torres Serranos

MS 9: Pore-scale modelling - Part 10
*Auditorium 3A - **Chairs:** Martin Blunt, Stephane Zaleski*

9:20	[508] **Pore-scale Two-phase Flow Simulation in Porous Media Coupling Pore Network Model and Lattice Boltzmann Method.** *Jianlin Zhao; Ali Mazloomi Moqaddam; Dominique Derome; Jan Carmeliet*
9:38	[658] **Upscaling hydrodynamic transport in heterogeneous porous media from fully advective to small Péclet number regimes.** *Alexandre Puyguiraud; Marco Dentz; Philippe Gouze*
9:56	[678] **Pore-network - lattice Boltzmann method hybrid model for multiphase flow.** *Eduard Puig Montella; Bruno Chareyre; Antonio Gens*
10:14	[684] **Modeling Dispersion in Pore Networks: Comparison of Pore-Scale Model Accuracy.** *Jeff Gostick; Mehrez Agnaou; Jake Baralett; Amin Sadeghi*

Oral presentations: Parallel sessions 12 *(cont.)*

MS 6: Physics of multi-phase flow in diverse porous media - Part 10
*Auditorium 3B - **Chairs:** Knut Jørgen Måløy, Gaetano Garfi*

9:20	[371] **Capillary pressure heterogeneity across scales: Insights from micro-CT imaging and continuum scale modelling.** *Samuel Jackson; Qingyang Lin; Sam Krevor*
9:38	[337] **Population balance modelling of particle deposition and aggregation in porous media.** *Gianluca Boccardo; Rajandrea Sethi; Daniele Marchisio*
9:56	[391] **Computational Tool Developed for Simulation of Nano-fluids Behaviors.** *Rasoul Arabjamaloei; Steven Bryant; Milana Trifkovic*
10:14	[390] **Effect of gas hydrate formation and decomposition on flow properties of fine-grained sediments using X-CT based pore network modeling.** *Daigang Wang; Chenchen Wang; Chengfeng Li; Changling Liu; Hailong Lu*
10:32	[831] **Pattern formation of frictional fingers in a gravitational potential.** *Knut Jorgen Maloy; Eirik Grude Flekkoy; Jon Alm Eriksen; Bjornar Sandnes; Toussaint Renaud; Olivier Galland*

MS 7: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - Part 8
*Room 3 - **Chairs:** Sorin Pop, Paolo Zunino*

9:20	[674] **Upscaling unsteady and inertial single-phase flow in homogeneous porous media.** *Didier Lasseux; Fransisco Valdes-Parada; Fabien Bellet*
9:38	[785] **A Dynamical System for Gas Phase Cycling in Porous Media.** *Alex Chang; Brent Lindquist*
9:56	[853] **Micro-Scale Mathematical Model of Freezing in a Porous Medium.** *Alexandr Zak; Michal Benes; Martina Sobotkova; Tissa H. Illangasekare*
10:14	[820] **Numerical Simulation of Multiphase Flow inside Porous Media at Low Pressure.** *Haowei Hu; Ruina Xu; Peixue Jiang*

FRIDAY, 10 MAY 2019

Oral presentations: Parallel sessions 12 *(cont.)*

MS 3: Flow, transport and mechanics in fractured porous media - Part 9
*Room 1 - **Chairs:** Inga Berre, Holger Steeb*

9:20	[235] **Effect of fractures geometrical and hydrodynamic characteristics on natural convection in fractured porous enclosure.** *Fanilo Ramasomanana; Marwan Fahs; Husam Baalousha; Vincent Fontaine*
9:38	[95] **Numerical simulation of fluid flow and heat extraction in Enhanced Geothermal System based on discrete fractures model.** *Xu Zhang; Jun Yao; Zhaoqin Huang; Zhixue Sun*
9:56	[652] **Effect of flow-path tortuosity and contact area fraction on permeability of a rough rock fracture.** *Hoda Javanmard; Daniel Vogler; Anozie Ebigbo; Martin O. Saar*
10:14	[804] **Multipoint flux mixed finite element methods for a double-porosity model of single-phase flow in naturally fractured reservoirs.** *Andres Arraras; Laura Portero; Javier Zaratiegui*
10:32	[160] **Impact of creep on the permeability evolution of coal by the thermo-mechanical coupling.** *Zengchao Feng*

MS 1: Porous Media for a Green World: Energy & Climate - Part 5
*Room 2 - **Chairs:** Rainer Helmig, Hadi Hajibeygi*

9:20	[126] **Reduced Complexity Modelling of CO2 Leakage Through Faults.** *Francesca Watson; Mary Kang; Florian Doster; Mike Celia; Jan Martin Nordbotten*
9:38	[107] **Experimental investigation on anisotropic permeability and its relationship with anisotropic thermal cracking of oil shale under high temperature and triaxial stress.** *Dong Yang; Guoying Wang; Zhiqin Kang*
9:56	[364] **Dynamic Multiscale Simulation of Fractured Geothermal Reservoirs.** *Mousa HosseiniMehr; Cornelis Vuik; Hadi Hajibeygi*
10:14	[875] **Reactive silicate mineral carbonation under diffusive transport and confining stress.** *Anne Menefee; Brian Ellis*
10:32	[426] **Dynamic Pore-Scale Study of Water-Salinity Effect on a Moving Oil Droplet.** *Moataz Abu-Al-Saud; Hamdi Tchelepi*

Oral presentations: Parallel sessions 12 *(cont.)*

MS 13: Fluids in Nanoporous Media - Part 5
*Room 6 - **Chairs:** Gennady Gor, Patrick Huber*

9:20	[265] **Permeation of gas through single-layer nanoporous graphene membranes: theory and molecular simulations.** *Romain Vermorel; Fouad Oulebsir; Juncheng Guo; Guillaume Galliero*
9:38	[309] **Permeation and separation of CH4/CO2 mixtures through single-layer nanoporous graphene membranes : theory and molecular simulations.** *Juncheng Guo; Romain Vermorel; Guillaume Galliero*
9:56	[403] **Numerical estimation of compacted illite multiphase transport properties from pore-scale simulations using FIB-SEM images.** *Aliaksei Pazdniakou; Anne-Julie Tinet; Magdalena Dymitrowska; Fabrice Golfier; Jerome Vicente; Marc Prat*
10:14	[103] **Coupling of Adsorption and Transport in Hierachical Porous Materials.** *Alexander Schlaich; Benoit Coasne*
10:32	[813] **Molecular Simulation of Water Adsorption in Shale Organic Nano-Pores.** *Kecheng Zeng; Ruina Xu; Peixue Jiang*

MS 18: Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers - Part
*Room 8 - **Chairs:** Christos Tsakiroglou; Olga Vizika Kavvadias*

9:20	[151] **Groundwater Remediation using Nanotechnology.** *Tannaz Pak; Luiz Fernando de Lima Luz Jr; Tiziana Tosco; Gabriel Schubert Ruiz Costa; Paola Rosa; Nathaly Lopes Archilha*
9:38	[58] **Flow in porous media of foams reinforced with polymers or particles: application to subterranean oil pumping.** *Natacha Forey; Olivier Atteia; Abdelaziz Omari; Henri Bertin*
9:56	[297] **Multiscale modelling of NAPL dissolution in porous media in the presence of pore and continuum scale heterogeneity.** *Morteza Aminnaji; Masoud Babaei; Arash Rabbani*
10:14	[420] **Non-Newtonian behaviour of foam flow in porous media: experiments and upscaling.** *Sagyn Omirbekov; Hossein Davarzani; Stefan Colombano; Azita Ahmadi*

Friday Detailed Program

FRIDAY, 10 MAY 2019

Plenary Session 4

Plenary Lecture

Auditorium 1 - 11:15
Chair: *Sebastian Geiger*

Prof. Joanna Aizenberg

Materials, Chemistry & Chemical Biology
Harvard University

Multifunctionality of liquid-filled porous materials: from encryption and anti-fouling to efficient catalysis.

Liquids entrapped within a structured solid begin to exhibit unique behaviors often providing the surrounding material with unprecedented properties. Recently we have developed two award-winning materials platforms (R&D 100 awards in 2012 and 2013), both based on the infusion of a liquid into a porous substrate. First, we introduced a new strategy to create self-healing, anti-fouling materials (so-called Slippery, Lubricant-Infused Porous Surfaces, or SLIPS) that outperform state-of-the-art materials in their ability to resist ice and microbial adhesion and repel various simple and complex liquids. Second, we pioneered a technique for patterning 3D photonic crystals, generating complex wettability patterns, and illustrated multilevel encryption, with selective decoding by specific liquids, so-called Watermark Ink, or W-INK. Generalized, low-cost, and scalable methods to manufacture SLIPS and W-Ink on glass, ceramics, polymers, fabrics and metals will be presented. We anticipate that slippery surfaces can find important applications as antifouling materials in medicine, construction, fluid handling and transportation, while chemically patterned photonic structures can serve as colorimetric indicators for liquids, used in encryption and anti-tampering applications, and provide a novel platform for efficient catalytic materials.

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NOTES

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- Fundamentals of porous media
- Computational challenges in porous media simulation
- Experimental studies

Topics and Applications

- Mass and heat transport
- Multiphysics-multiphase flow
- Reservoir engineering, CO_2 sequestration, Geothermal energy and Energy storage
- Colloids and nanoparticle transport
- Soil Mechanics and Engineering
- Swelling porous media
- Wave propagation
- Biotechnology and Biofilms
- Thin and Nanoscale poromechanics
- Fuel cells and Batteries
- Food, Wood, Composites
- Fibers and Textiles
- Filters, Foams, Membranes, Papers
- Ceramics and Constructions materials

Venue and City

Qingdao International Conference Center (QICC) is located in the Olympic Sailing Center near the May 4th Square with its famous landmark sculpture *Wind of May,* a symbol of Qingdao city. QICC is at a favorable location by the sea and about an hour drive from the new Qingdao airport which will begin operation in September 2019. Qingdao is best known for Tsingtao Beer and international festivals which promote friendship, economic & cultural exchanges between China and others all over the world.

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