Contribution ID: **449** Type: **Poster (+) Presentation**

In-situ real-time imaging to characterize spatially heterogeneous calcite dissolution rates at the nanoscale

Wednesday, 2 June 2021 16:00 (1 hour)

Carbonate dissolution processes are significant in environmental and industrial contexts. Development of proper modeling frameworks to tackle, e.g, aquifer contamination, geologic carbon sequestration, disposal of toxic waste or hydraulic fracturing of hydrocarbon reservoirs requires enhanced and detailed knowledge of mineral dissolution/precipitation reactions kinetics. Advanced measurement instruments such as Atomic Force Microscopy (AFM) and Vertical Scanning Interferometry (VSI) have been recently employed to directly observe mechanisms involved in these reactions at the fluid-solid contact. Such studies have documented that there are several sources of variability that may affect the dissolution process at the microscopic level across mineral-fluid interfaces. This, in turn, yields marked spatial heterogeneities of reaction rates. A change of perspective towards an approach yielding quantification of reaction kinetics within a stochastic framework is of critical importance in this context. We employ modern geostatistical tools to characterize the spatial heterogeneity of reaction rate maps evaluated from a collection of in-situ and real time AFM observations of the surface topography of a millimeter-scale calcite sample subject to dissolution. Our aims include (1) the characterization of the statistical behavior of topography and dissolution rate data and their spatial increments; (2) the identification of an appropriate interpretive statistical model; and (3) a quantitative evaluation of the temporal evolution of the spatial heterogeneity of reaction kinetics.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

Acceptance of Terms and Conditions

Click here to agree

Newsletter

I do not want to receive the InterPore newsletter

Student Poster Award

Yes, I would like to enter this submission into the student poster award

Primary authors: BUSSETTI, Gianlorenzo (Politecnico di Milano); DUO', Lamberto (Politecnico di Milano); GUADAGNINI, Alberto (Politecnico di Milano); RECALCATI, Chiara (Politecnico di Milano); RIVA, Monica (Politecnico di Milano); SIENA, Martina (Politecnico di Milano)

Presenter: RECALCATI, Chiara (Politecnico di Milano)

Session Classification: Poster +

Track Classification: (MS11) Microfluidics in porous systems