Contribution ID: **562** Type: **Poster (+) Presentation**

Fabrication of Reactive Rocks with 3D Printing

Monday, 31 May 2021 19:35 (1 hour)

The heterogeneity of natural geologic samples presents significant challenges in furthering our understanding of geochemical reactions in porous media. This investigation explores the feasibility of fabricating reactive rocks through novel additive manufacturing techniques by integrating reactive materials with polymer filaments. Using 3D X-ray Computed Tomography (X-ray CT) images of a sandstone sample from the Paluxy formation in Mississippi, a template was created to 3D print a model of the system's pore structure. Two methods for fabricating a rock structure consisting of a reactive phase that reflects the properties of the real sample are investigated here. The first method entails mixing calcite particles with HIPS pellets and extruding a customized reactive filament. The second method consists of dispersing calcite in THF and using the resultant mixture to coat segments of HIPS filament. The filaments were used to 3D print models, and the relative success of each method was evaluated via by optical microscopy, 2D Scanning Electron Microscopy, and 3D X-ray CT imaging. For each set of images, calcite volume fractions and the exposed calcite surface area are determined using ImageJ and MATLAB. Results from the first method indicate that calcite surface areas are comparable to real samples, albeit most of the calcite is inaccessible. This will be compared with accessible surface areas of samples printed with the calcite coated filament. These findings will be used to inform further pathways for utilizing 3D printing as a means of modelling reactive porous media in pursuit of a solution that accurately reflects the pore structure and reactive properties of real samples.

Time Block Preference

Time Block B (14:00-17:00 CET)

References

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Primary authors: Ms WALES, Shelby (Auburn University Department of Chemical Engineering); Mr ANJIKAR, Ishan (Auburn University Department of Civil and Environmental Engineering); Ms SHINDE, Vinita (Auburn University Department of Chemical Engineering); Dr BECKINGHAM, Bryan (Auburn University Department of Chemical Engineering); Dr BECKINGHAM, Lauren (Auburn University Department of Civil and Environmental Engineering)

Presenter: Ms WALES, Shelby (Auburn University Department of Chemical Engineering)

Session Classification: Poster +

Track Classification: (MS8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media