

Invitation to Seminar

Statistical characterization of the spatial heterogeneity of calcite dissolution rates

Understanding reactive processes at solid-liquid interfaces is essential for the characterization of flow and transport in porous media, as these drive possible alterations of key physical attributes of the hosting formation. However, proper assessment of mineral dissolution kinetics is critical due to the spatial heterogeneity of reaction rates observed at multiple scales. High-resolution imaging techniques such as Atomic Force Microscopy (AFM) enable one to observe the surface topography of a reacting crystal at the molecular level. These techniques allow detecting the occurrence of different dissolution mechanisms, yielding spatially non-uniform rates. We investigate dissolution heterogeneity on a calcite sample exposed to deionized water. We obtain maps of reaction rate from the difference of in-situ and real-time AFM measurements of topography at subsequent times. Spatial statistics of rates are interpreted with a mixture model, in which each component is associated with a particular feature of the dissolution pattern. The time evolution of the model parameters can provide quantitative insights on the dynamics of the physical mechanisms driving the reaction.

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Martina Siena is Assistant Professor at the Department of Civil and Environmental Engineering (DICA) at Politecnico di Milano. Her research interests include characterization of flow and transport phenomena in porous and fractured media, pore-scale numerical simulations of flow and reactive processes at the fluid/solid interface.

Wednesday 24 November 2021, 1.00pm-2.00pm
Online (via Teams)