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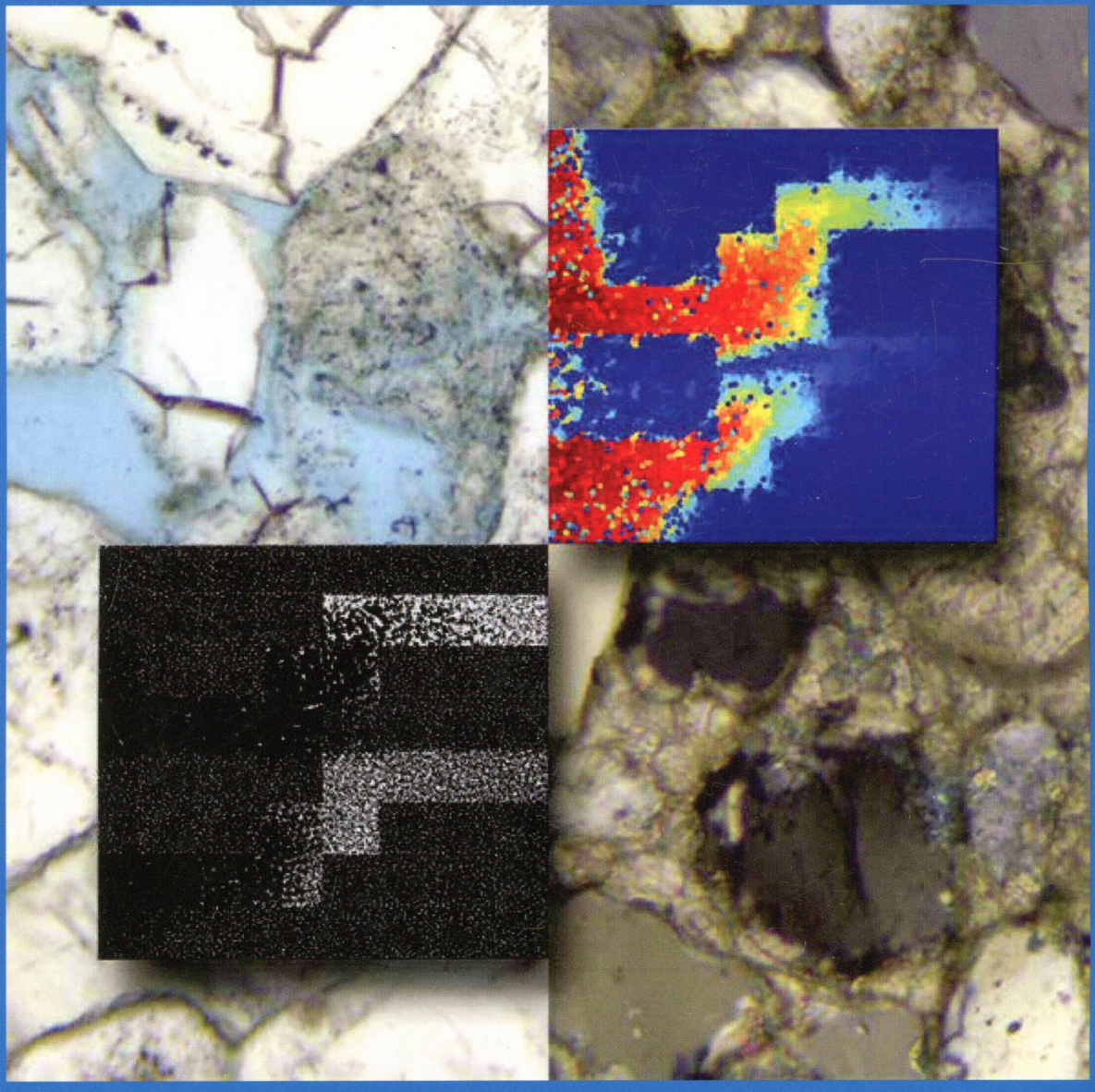

Integrating Experiments, Simulations, and Natural Analog Site Analyses for Security of Geological CO_2 Storage
(see page 15103)

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ON THE COVER: Integrating experiments, simulations, and natural analog site analyses for security of geological CO_2 storage. Research at the Center for Frontiers of Subsurface Energy Security (CFSES), a Department of Energy, Energy Frontier Research Center, provides insights into the geological CO_2 storage process. The background images are photomicrographs of unaltered (left) and altered (right) sandstone in the vicinity of a natural CO_2 seepage conduit at Little Grand Wash fault in Utah, USA. Primary porosity (blue) has been completely occluded in the altered sandstone by carbonate pore cement that precipitated from upward migrating CO_2-charged brine. The negative feedback between focused fluid flow and calcite cementation contributes to the tendency of preferred flow pathways to migrate in space and time. Overset images show cementation (left) and normalized concentration (right) fields from multiscale reactive transport simulations that capture emergent behavior resulting from coupling of convection and reaction on the pore scale. This analysis provides quantitative insight into mechanisms for redirection of escape pathways due to pore plugging, as observed at Little Grand Wash fault. (Modified after multiple figures in Mehmani, Y.; Sun, T.; Balhoff, M. T.; Eichhubl, P.; Bryant, S. Multiblock Pore-Scale Modeling and Upscaling of Reactive Transport: Application to Carbon Sequestration. *Transp. Porous Media* **2012**, *95*, 305−326, with kind permission from Springer Science and Business Media.) See page 15103.

Feature Article

Articles

Energy Conversion and Storage; Energy and Charge Transport

Surfaces, Interfaces, Porous Materials, and Catalysis

Plasmonics, Optical Materials, and Hard Matter

Physical Processes in Nanomaterials and Nanostructures

Additions and Corrections

Ⓢ Supporting Information available via online article