

## **Using micromodels with reactive substrates to access the relationship between transport and reaction at the pore scale**

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Sources of discrepancy between field and laboratory measured mineral dissolution rates remain unquantified despite their significance in terms of interpretation and prediction of chemical processes in natural systems. The effect of transport on dissolution rates at the pore scale is one of the influential factors with a high uncertainty. In laboratory settings, well-mixed conditions are often maintained, which eliminates the effect of transport on the dissolution rates. Transport, however, becomes a governing factor in transport limited reaction regimes. Pore scale modeling has been used to access the relationship between reaction and transport and a few experimental studies have been conducted. Difficulties in experimental studies include reproduction of the small (few micrometers) and complex nature of pore networks. In this regard, approaches incorporating microfluidic platforms provide a unique opportunity for investigating the physicochemical behavior of fluid in porous media at the pore scale. Microfluidic devices have been successfully applied for characterizing and visualizing fluid flow behavior by using non-reactive substrates like glass or PDMS. Here we adapt microfluidic techniques for investigating the chemical reactivity of minerals by using reactive substrates. We have successfully created micro-models of idealized pore network structures in albite and anorthite using femtosecond plasma-mediated laser ablation. We are expecting this research to (1) provide direct experimental evidence of coupled reactive transport at the pore scale and (2) improve applicability of lab measured mineral dissolution rates to field scale.