Interfacial energy-driven fluid migration and mass-transfer mechanism inferred from quartzite-water infiltration experiments

Michihiko Nakamura[1]

[1] Earth Planet. Sci., Tokyo Inst. Tech.

http://www.geo.titech.ac.jp

Kinetics of interfacial energy-driven fluid infiltration was experimentally investigated in a quartzite-water system at lower crustal conditions. The fluid fraction forms a high-porosity zone, which advanced like a propagating solitary-wave. The porosity wave is mainly formed by grain-curvature gradient due to grain growth enhanced by fluid. The infiltration kinetics was simulated with a steady diffusion model. The deduced solubility difference between dissolving and precipitating parts shows good agreement with that calculated from the pore curvature. Cathode luminescence observation revealed that the grain growth proceeds via extensive dissolution-precipitation, which would promote the chemical equilibration between fluid and rock more effectively than volume diffusion in crystal.