# Effects of Flow and Hydrochemical Properties on Mixing-induced Iron Precipitation in Porous Media: Pore-scale Study with Dynamic Imaging

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Managed aquifer recharge and recovery (MAR) is a promising technology for sustainable water resources. Typical MAR techniques require injection of oxic surface water into an aquifer. The mixing between different two different water bodies induces various chemical reactions such as iron oxidation. The objective of this study is to evaluate the effect of flow rate and hydrochemical properties such as dissolved oxygen concentration, pH, and ion composition on the morphology and rate of iron precipitation.

We perform visual millifluidic experiments using silicon based homogeneous pore cell mimicking the porous media. Iron precipitates formed was visualised using the microscope and camera Qimaging RETIGA 6000.

The stripe pattern was observed when the pH of oxic and anoxic water were 10.04 and 3.99, respectively (Fig. 1A) whereas coarse iron precipitate pattern (Fig. 1B) was observed when the pH of solutions were in the neutral pH range (6.04 and 7.06). pH is known to control iron precipitation rate, and our initial result demonstrates that it can also impact morphology of iron precipitation. The effect of other parameters such as flow rate and ion composition on the iron precipitation will also be presented.

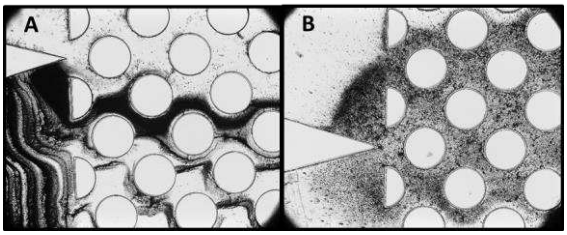


Figure 1- A. Iron precipitation at extreme different pH condition (SW pH 10.04, GW pH 3.99). B. Iron precipitation at neutral pH condition (SW pH 6.04, GW pH 7.06).