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IMPACT OF DUAL POROSITY SYSTEMS ON FLOW IN HEAP LEACHING USING MICRO COMPUTED TOMOGRAPHY IMAGING

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The global progress with the energy transition from fossil fuels to renewable energy has boosted the demand for metals. Copper, amongst all metal resources, is regarded as an essential raw material in producing the conduit to reduce the energy needed during electricity production. Most of the low-grade copper is recovered from heap leaching, which is a well-established hydrometallurgical method.
However, a low recovery remains a significant challenge of this method. This poor leaching performance is caused by the variation of the leaching kinetics driven by not only the leaching fluid transport at the particle scale but also the mass transport at the grain scale. Previous studies have implemented a collection of numerical and experimental methods to investigate the leaching performance under a variety of scales and leaching conditions but rarely investigated the process using a multiscale approach.
Herein, we implemented a fundametal study the flow behaviour in a dual porosity system, which is by visualising the fluid transport and measuring the liquid contents under the particle and grain scale. A series of leaching experiments is conducted using water with packed glass beads and chalcopyrite beads. We image the column in regular periods under Micro Computed Tomography (Micro-CT) imaging over several days of the leaching period. We label and track mineral grains from high-resolution images and monitor the alternation of the mineral size and porous media structure. Our study shows the impact of dual porosity systems on flow patterns and the performance of leaching on mineral grain within different particles. Our results highlight the importance of multiscale simulation for the design and optimisation of heap leaching.
Keywords: Heap leaching, dual-porosity, Micro-CT, column test

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