MICROSCALE SIMULATION OF THE IP RESPONSE

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Understanding the SIP response of rocks is still a challenge even though many model approaches have been published. However, most of these models base on simplified assumptions regarding both the microstructure and the physics of the processes at the rock-electrolyte interface. Moreover, the simulations of porous medium behavior often treat the medium as homogeneous and link their material properties to microstructural properties by empirical equations. We intend to overcome these limitations by simulating the IP response of porous media at the microscale.

Here, we introduce microscopic simulations of the time domain induced polarization response of geometrically simple porous media using MATLAB®. The developed module simulates the coupled diffusion and migration of charges in an electric field by solving the Nernst-Planck-Poisson (NPP) equations in 2D. For that, we discretise the non-dimensionalized NPP equations in space using the Finite Difference Method and in time using first order Euler Schemes. We use the module for parameter studies such as influence of particle and pore size on the IP response.