

Integrating Techniques: LB Simulations (and NMR studies) of biofilm growth in porous media

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Lattice Boltzmann (LB) based simulation techniques are a particularly powerful and well suited mesoscopic methodology for simulating pore-scale flow fields and solute diffusion in complex porous media^{e.g.(1)}. Here we extend this LB modeling platform to include nutrient consumption and subsequent biofilm growth and detachment⁽²⁾, using a coupled discrete bio-entity approach. This is used in combination with, and is validated by, various magnetic resonance (MR) techniques applied to elucidate the bio-processes occurring at the pore scale. Examples of biofilms used for (i) groundwater cleanup (metal pollutant absorption or modification), (ii) bio-barriers to reduce local permeability⁽³⁾ and (iii) which foul reverse osmosis water purification processes will be presented⁽⁴⁾.

Literature

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