Transport and deposition of rigid suspended particleson the patterned membrane surface

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A numerical simulation is developed to analyze transport and deposition of rigid particles on the patterned membrane surface. Mitigation of membrane fouling is one of the most important issues to improve the membrane separation process. Hydrodynamic methods, which utilize flow motion to induce fluid mixing and back transport of the deposited foulants, have drawn considerable academic interests as less energy consumption and chemical agents are required. A patterned membrane, which has micron-sized surface patterns are engraved on, exhibits anti-fouling properties and it is considered to be related with flow characteristics near the patterned membrane surface in the previous studies. However, none of the previous works clearly proposed the mechanism of the particle deposition on the patterned membrane surface. In this work, we developed a modified Brownian dynamics simulation for the transport and deposition of suspended particles on the patterned membrane surface. With the presence of the surface patterns, the trajectories of the suspended particles are distorted and their approach to the membrane surface is hindered, which leads less particle deposition on the membrane surface.