Brownian dynamics simulation of particle deposition on the patterned membrane surface

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Membrane fouling has remained as a serious drawback in the use of membrane technology for waste-water treatment. Among the efforts of reducing membrane fouling, micro-patterned membrane showed a good anti-fouling performance without any chemical or biological treatment. Previous studies focused on the mitigation of fouling on the patterned membrane surface. Mechanism of particle deposition seems to be related with the flow characteristics near the membrane surface, but it is not well understood. In this study, particle deposition on the patterned membrane surface is numerically and experimentally studied. Brownian dynamics simulation was conducted on the geometry of cross-flow microfiltration module of patterned membrane to track the motion of the buoyant suspended in the bulk flow. Flow field near the surface pattern was solved with the Navier-Stokes equations, which were discretized by Finite Element Method (FEM). Colloidal particles fouled on the patterned membrane surface were tracked and counted to analyze the particle deposition phenomena on the membrane surface.