Flow Effects on Microparticles near Structured Interfaces

Vladimir Lobaskin, Mark Ross-Lonergan

School of Physics and Complex and Adaptive Systems Lab, University College Dublin, Belfield, Dublin 4, Ireland

We use a hybrid Langevin dynamics − lattice Boltzmann simulation to study solute transport past a structured solid-liquid interface. The solid surface is modified by a grafted polymer brush or an array of rigid nanopillars. We analyse the flow field near the interface and its effect on the particle motion in a pressure driven and shear flows. Moreover, we show that an interplay between the flow and excluded volume interactions between the particles and pillars leads to appearance of hydrodynamic lift forces, which can promote a depletion of a solute from the array or its accumulation at the surface. We also discuss how the nanopillar array can be used for particle sorting.