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## Fluid/solid interface processes associated with emerging materials

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The paper concerns processes at fluid/solid interfaces, which can lead to the design of new materials that meet specifications with regard to flow velocity, thermal conductivity and shear viscosity. In particular, the talk will focus on the effects of surface roughness on nanoflows. A fractal model is employed to model wall roughness, and molecular simulations are performed for liquid argon confined by two solid walls. It is shown that the surface roughness reduces the velocity in the proximity of the walls with the reduction being accentuated when increasing the roughness depth and wettability of the solid wall. It also makes the flow three-dimensional and anisotropic. In flows over idealized smooth surfaces, the liquid forms parallel, well-spaced layers, with a significant gap between the first layer and the solid wall. Rough walls distort the orderly distribution of fluid layers resulting in an incoherent formation of irregularly shaped fluid structures around and within the wall cavities. Furthermore, we show that while the viscosity in smooth channels remains constant across the channel width, in the presence of surface roughness it increases close to the walls. The increase of the boundary viscosity is further accentuated by an increase in the depth of surface roughness.

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