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Sliding Friction on Liquid-Infused Surfaces ZIAD RASHED, MOHAMMAD HABIBI, JONATHAN BOREYKO, Virginia Tech — Slippery porous liquid-infused surfaces (SLIPS) are well-known for their ability to stably minimize the hysteresis of a wide variety of liquids. However, whether SLIPS could also reduce the sliding friction of solid objects has not been given much consideration. Here, we measure the friction force associated with dragging an aluminum cube across an array of ordered silicon micropillars impregnated with silicone oil. The solid fraction of the micropillars was either 0.025 or 0.25, while the viscosity of the silicone oil was 10, 100, or 1,000 cSt. Non-intuitively, it was observed that the sliding friction decreased with increasing lubricant viscosity or increasing solid fraction. These findings suggest that the key parameter is therefore the hydraulic resistance of the alleys between the micropillars, which should be as large as possible to minimize lateral oil drainage from underneath the sliding body. This would indicate that scaling down to nano-roughness would be optimal for minimizing the sliding friction, which was confirmed by additional experiments on a disordered nanostructured substrate.

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