Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Drag Measurements in Laminar Flows over Superhydrophobic Porous Membranes OZGUR OZSUN, VICTOR YAKHOT, KAMIL L. EKINCI, Boston University — An anomalous hydrodynamic response has recently been observed in oscillating flows on mesh-like porous superhydrophobic membranes.[1] This effect was attributed to a stable Knudsen layer of gas at the solid-liquid interface. In this study, we investigate laminar channel flow over these porous superhydrophobic membranes. We have fabricated surfaces with solid area fraction ϕ_s, which can maintain intimate contact with both air and water reservoirs on either side. Typical structures have linear dimensions of 1.5 mm $\times$ 15 mm $\times$ 1 μm and pore area of 10 μm $\times$ 10 μm. The surfaces are enclosed with precisely machined plastic microchannels, where pressure driven flow of DI water is generated. Pressure drop across the microchannels is measured as a function of flow rate. Slip lengths are inferred from the Poiseuille relation as a function of ϕ_s and compared to that of similar standard superhydrophobic surfaces, which lack intimate contact with an air reservoir.

[1]S. Rajauria, O. Ozsun, J. Lawall, V. Yakhot, and K. L. Ekinci, Phys. Rev. Lett. 107, 174501 (2011)

Ozgur Ozsun
Boston University

Date submitted: 18 Nov 2011 Electronic form version 1.4