Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

On the Resistance of Nanofibrous Superhydrophobic Coatings to Hydrostatic Pressures[1] T.M. BUCHER, B. EMAMI, H. VAHEDI TAFRESHI, M. GAD-EL-HAK, G.C. TEPPER, Virginia Commonwealth University — We present a numerical study aimed at investigating the influence of microstructural parameters on the resistance of submerged fibrous superhydrophobic coatings to elevated hydrostatic pressures. In particular, we generate 3-D virtual geometries comprised of randomly or orthogonally oriented horizontal fibers with bimodal diameter distributions resembling the microstructure of coatings produced via DC and AC electrospinning, respectively. These virtual geometries are then used as the computational domain for performing Full Morphology (FM) simulations to establish a relationship between the coatings' critical pressure—pressure beyond which the surface departs from the Cassie state—and their microstructures. Our numerical simulations are aimed at providing guidelines for the design and optimization of the coatings' microstructures.

[1]Financial support from DARPA, contract number W91CRB-10-1-0003, is acknowledged.

Mohamed Gad-el-Hak
Virginia Commonwealth University

Date submitted: 22 Jun 2011 Electronic form version 1.4