

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Wicking/absorption of a liquid droplet into nano-porous fibers¹

GERARDO CALLEGARI, TRI Princeton, JIA QI, ANTHONY RIBAUDO, TRI PRINCETON TEAM — Contrary to what happens on a planar wetting substrate, a droplet sitting on a wetting solid smooth fiber can stay without spreading. In a fiber with parallel grooves, the liquid wicks into the channels. Here, we are interested in characterizing nano-porous fibers where the wicking front propagates through longitudinal micron size grooves and the liquid also penetrates inside the nano-porous fiber with tuned pore size in the range of tens of nm. The difference in groove to pore sizes produces a faster longitudinal than transversal liquid movement, allowing for model simplifications and leading to analytical solutions for the model proposed, that couples absorption with wicking dynamics. Experimental data on the droplet shape/volume together with front propagation are compared with the solution of the model to extract information of the fiber's structure which is compared with SEM images of the cross-sections of the fibers. The nano-porous composite fibers produced by coagulation wet spinning, were proposed to be used as bio-sensing device, drug delivery systems and neuron-implantable electrodes.

¹This work was possible by # 5R01EB007467-03 NIH grant.

Gerardo Callegari
TRI Princeton

Date submitted: 03 Aug 2010

Electronic form version 1.4