Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Wetting and drying of liquid on crossed fibers ALBAN SAURET, ALISON D. BICK, HOWARD A. STONE, Princeton University, COMPLEX FLUIDS GROUP TEAM — Fibrous media are common in various engineered systems such as filters, paper or the textile industry. Many of these materials can be described as a network of fibers in which a wetting liquid tends to accumulate at its nodes and changes the bulk properties. Here we study a drop of silicone oil sitting on the simplest element of the array: two rigid crossed fibers. In particular, we investigate experimentally how the structure of the material affects the wetting and drying dynamics of that liquid drop. We first show that the liquid can adopt different shapes from a long liquid column to a drop. The transition between these morphologies depends on the volume of liquid, the tilting angle between the fibers, as well as the fiber radius. The wetting length in the column state can be predicted analytically. Because of these different shapes, the liquid exhibits different drying kinetics, which effects the overall drying time. Our study suggests that shearing a wetted array of fibers, by tuning the liquid morphology, may enhance the drying rate.

Alban Sauret
Princeton University

Date submitted: 27 Jul 2013 Electronic form version 1.4