

Abstract Submitted
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Drops spreading on flexible fibers KATARZYNA SOMSZOR, FRANÇOIS BOULOGNE, Princeton University, ALBAN SAURET, SVI - CNRS, EMILIE DRESSAIRE, NYU Polytechnic School of Engineering, HOWARD STONE, Princeton University — Fibrous media are encountered in many engineered systems such as textile, paper and insulating materials. In most of these materials, fibers are randomly oriented and form a complex network in which drops of wetting liquid tend to accumulate at the nodes of the network. Here we investigate the role of the fiber flexibility on the spreading of a small volume of liquid on a pair of crossed flexible fibers. A drop of silicone oil is dispensed at the point of contact of the fibers and we characterize the liquid morphologies as we vary the volume of liquid, the angle between the fibers, and the length and bending modulus of the fibers. Drop morphologies previously reported for rigid fibers, i.e. a drop, a column and a mixed morphology, are also observed on flexible fibers with modified domains of existence. Moreover, at small inclination angles of the fibers, a new behavior is observed: the fibers bend and collapse. Depending on the volume, the liquid can adopt a column or a mixed morphology on the collapsed fibers. We rationalize our observations with a model based on energetic considerations. Our study suggests that the fiber flexibility adds a rich variety of behaviors that can be crucial for industrial applications.

Katarzyna Somszor
Princeton University

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