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Suspension coating on a fiber EMILIE DRESSAIRE, BRIAN DINCAU, UCSB, QUENTIN MAGDELAINE, SVI (CNRS/Saint Gobain), ETHAN MAI, UCSB, MARTIN BAZANT, MIT, ALBAN SAURET, UCSB — The thickness of the coating layer entrained by a solid withdrawn from a bath depends on the physical properties of the fluid, the withdrawal speed, but also on the substrate geometry. In particular, many common substrates that are subjected to liquid immersion and withdrawal have the general shape of a thin cylinder such as needles, wires, and fibers. We investigate glass fibers as a model substrate and demonstrate that their diameter plays a dominant role in the particle entrainment and coating by suspensions. We identify experimentally and rationalize different coating regimes of the fiber: at small capillary number, only a liquid film coats the fiber. At intermediate capillary numbers, a heterogeneous coating made of clusters of particles is observed. Finally, at large capillary number, the thickness of the entrained film is captured using the effective viscosity of the suspension. Our results demonstrate that varying the size of the fiber leads to a new degree of control in the entrainment of particles via capillary filtering.

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