Supplementary information: Capturing aerosol droplets with fibers

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MIST COLLECTION ON A SINGLE FIBER

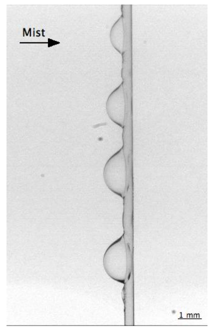


FIG. 1. Movie S1: Mist collection onto a single fiber of diameter $d_f = 400\mu$m.

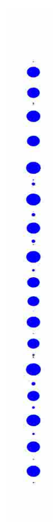


FIG. 2. Movie S2: Numerical model of drop growth and coalescence.

INCLINED FIBERS

We use the same single fiber setup to determine the effect of fiber inclination on the maximal drop size R_{df} (Fig. S4 a). In parallel, we measure the collection rate of a net composed of inclined fibers (Fig. S4 b). We use the maximal drop size to evaluate St_{drop} and predict the efficiency E_{drop} as described in the main text. While the values at large

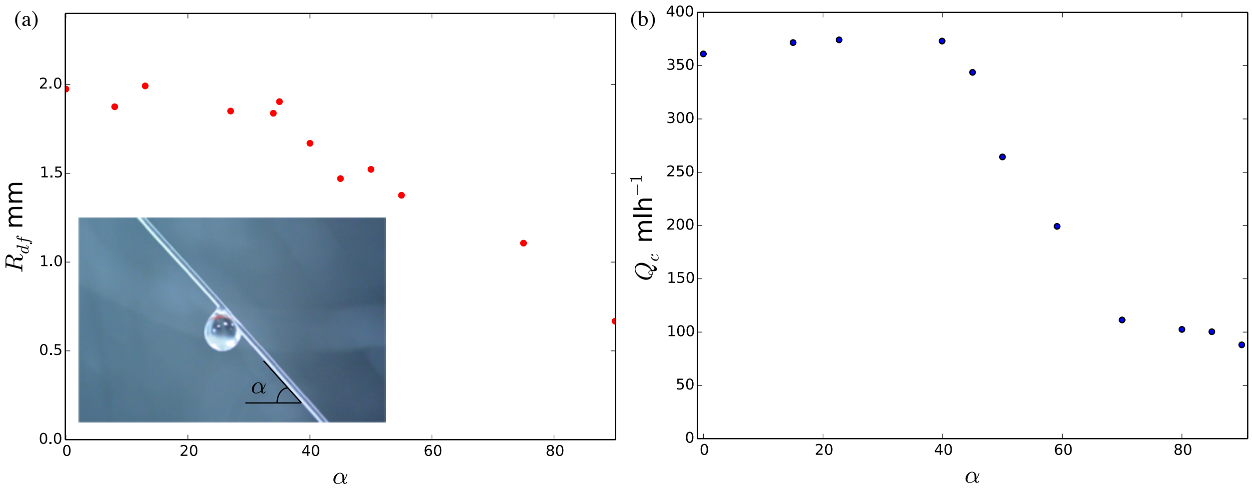


FIG. 3. a) Maximal drop size as a function on inclination angle α for a fiber of diameter $d_f = 300\ \mu m$. b) Collection flow rate for a net composed of inclined fibers of diameter $d_f = 300\ \mu m$ as a function of α.

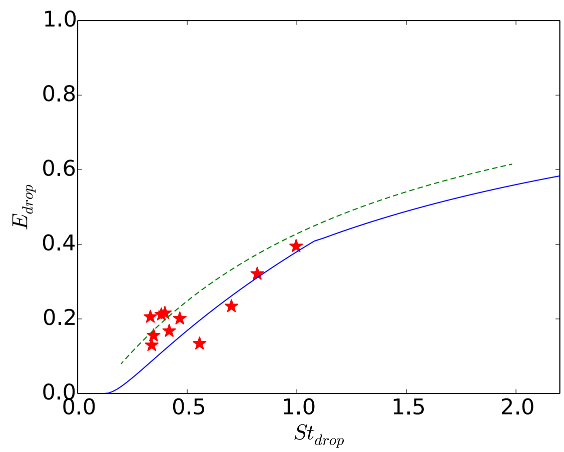
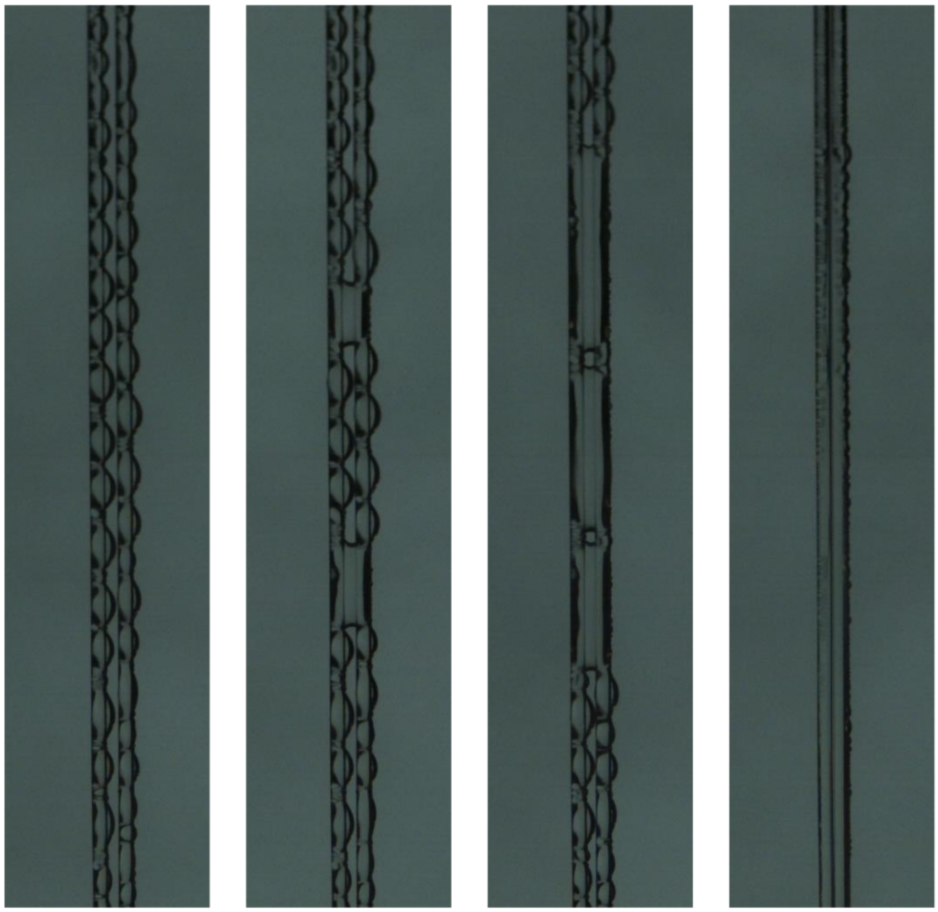


FIG. 4. Collection efficiency with inclined fibers of diameter $d_f = 300\ \mu m$ and varying flow velocity; experimental data (symbols), cylinder model (eq (5-7) (blue line), and spheres model (green dashed line).

Stokes are in excellent agreement with the impaction model (5-7), scatter can be observed at smaller Stokes i.e. large drops that are obtained in nearly horizontal fibers. These large drops more resemble spheres barely affected by the presence of the fiber than cylinders of size R_{df}. As for cylinders, Langmuir and Blodgett propose a solution for an assembly of spheres (eqs (50)-(53) in ref [8]). We plot this solution alongside our experiments in Fig. S5; the model with spheres agrees well with the experiments at low Stokes number.

COLUMN FORMATION

If the distance between fibers is reduced, drops can bridge adjacent fibers and induce the formation of long liquid columns (Fig. S5).



(a) (b) (c) (d)

FIG. 5. Drop growth and formation of capillary bridges on close fibers, starting from dry fibers.