

Abstract Submitted
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Elastocapillary mist collector CAMILLE DUPRAT, ROMAIN LABB, ANA REWAKOWICZ, LadHyX, Ecole polytechnique — Fibrous media are commonly used to collect droplets from an aerosol. In particular, woven textiles are used to harvest fresh water from fog, and coalescing filters made of non-woven entangled fibers are used to extract oil drops from gas streams. We propose a novel mist collector made of a forest of vertical flexible threads. As the droplets accumulate on the fibers, capillary bridges are formed, leading to the collapse of adjacent fibers thus forming liquid columns. This improve the liquid collection by preventing clogging, enabling high capture and precluding re-entrainment of drops in the gas stream due to the immediate coalescence of incoming droplets, and promoting fast drainage. We find that the collection flow rate is constant and can be adjusted by varying the fibers arrangement and flexibility. We show that there is an optimal situation for which this collection rate, i.e. the global efficiency, is maximal due to an elastocapillary coupling that we further characterize with a model experiment. Specifically, we study the drainage between two flexible fibers. Depending on the geometry and the fiber deformations, several flow regimes are observed. We characterize these regimes, and discuss the consequences on the drainage velocity, and thus the collection efficiency.

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