

Supplement Information

Bioinspired spindle-knotted fibers with a strong water-collecting ability from humid environment

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Received (in XXX, XXX) Xth XXXXXXXXX 20XX, Accepted Xth XXXXXXXXX 20XX

5 DOI: 10.1039/b000000x

Figure S1.

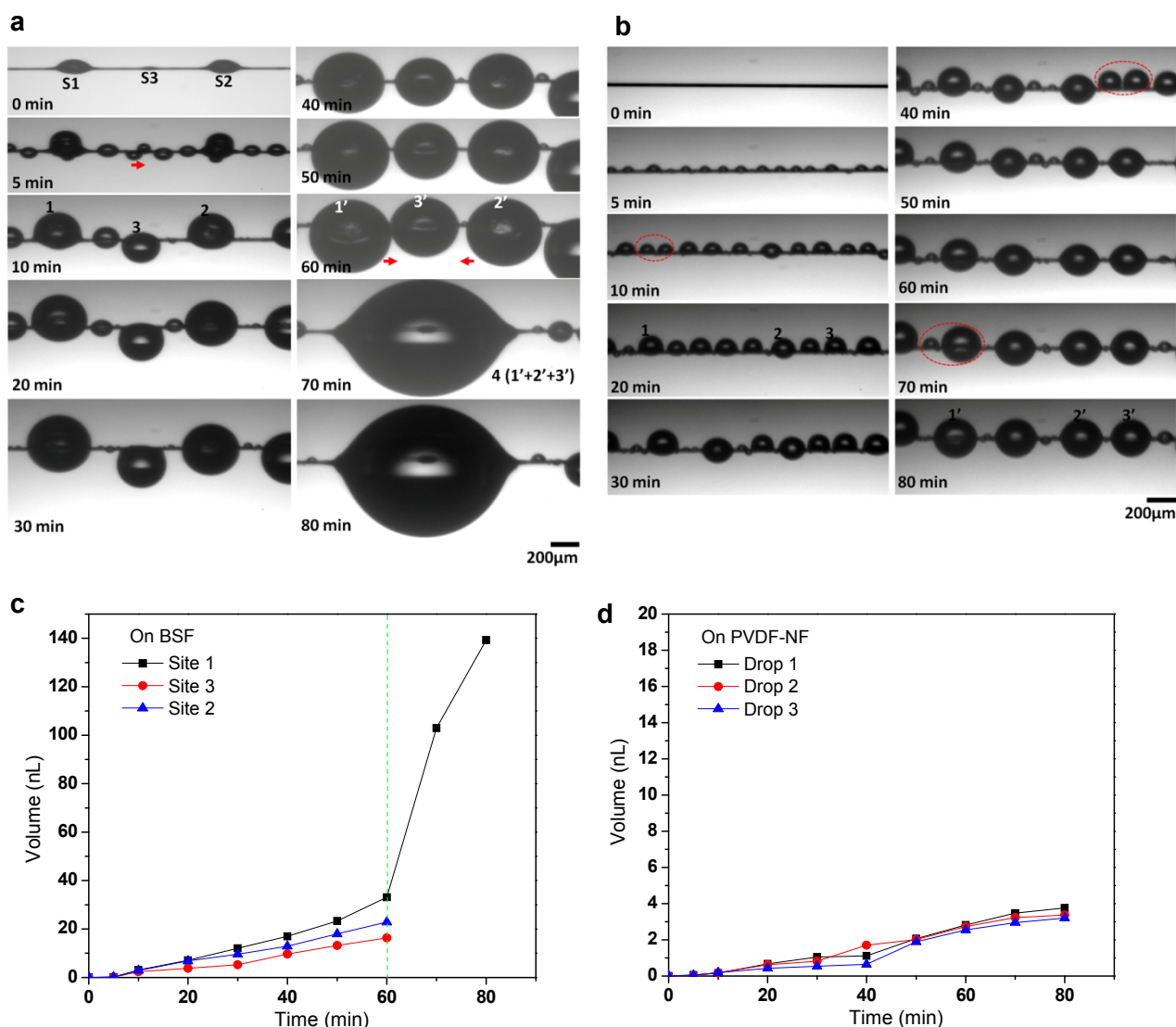


Figure S1. Water collection on BSF and uniform fiber (PVDF-NF) and water collection efficiency. a, Water collection on BSF. We focus on two spindle-knots ($H \sim 110 \mu\text{m}$; $W \sim 280 \mu\text{m}$) on BSF via natural water condensation from air in an enclosed chamber with humidity of $\sim 70\%$ at temperature of -5°C at time scale (ranged from 0 to ~ 80 min). To display clearly the behaviours of drops, three sites (s1, s2 at main spindle-knot, respectively, and s3 at satellite spindle-knot) are mainly observed. The drop 1 (at s1 site) and drop 2 (at s2 site) grows quickly in size more than that of drop 3 (at s3 site) in the time range from ~ 5 min to ~ 60 min. They are marked with drop1', 2' and 3' at s1, s2 and s3 site at ~ 60 min, respectively. Subsequently, they coalesced between two spindle-knots at ~ 70

min. a larger hanging-drop forms cover on two main spindle-knots including satellite and sub-satellite spindle-knots at 80 min. **b**, water collection on PVDF-NF. The PVDF-NF is fabricated by coating PVDF on nylon fiber via vertically drawing out from the PVDF solution (3%) with the rate of 8 mm/min. It is observed under the same experiment condition with (a). The behaviors of the tiny condensed drops on PVDF-NF are similar to that of NF. It is observed that two tiny drops coalesced into drop 1 at ~ 20 min and two ones did into drop 3 at ~ 50 min. Subsequently, the drop 1, 2 and 3 grow into drop 1', 2' and 3' at ~ 70 min, respectively. **c**, Relationship of drop volume versus time during the water collection process on BSF. A largest drop is collected via the coalescence of drops to reach the volume of ~ 140 nL at 80 min. **d**, Relationship of drop volume versus time during the water collection process on PVDF-NF. A largest drop is collected to reach the volume of ~ 4 nL at 80 min. BSF collect water can be ~ 35 times in ratio of volume more than that of uniform fiber (i.e., PVDF-NF).

Figure S2.

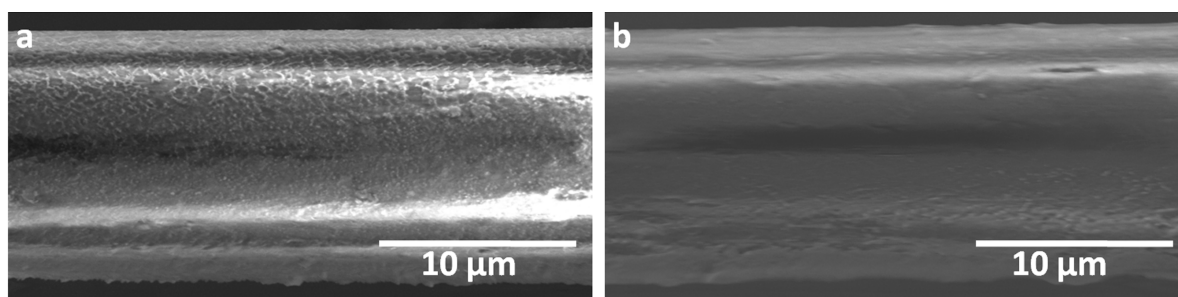


Figure S2. SEM image of PVDF-NF fiber and NF. **a**, The nano-protrusion rough structured surface of PVDF-NF due to PVDF layer on the top. **b**, The smooth surface of NF.