Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supplementary Information (ESI) for article "Multifunctional responsive fibers produced by dual liquid crystal core electrospinning" by YooMee Kye, Changsoon Kim and Jan Lagerwall.

Electron microscopy characterization of collapsed fibers collected on a hydrophilic substrate
A low resolution Scanning Electron Microscopy (SEM) image of two crossing fibers picked up on a regular (hydrophilic) silicon substrate (with silicon oxide top surface) is shown in Fig. ESI 1. In order to avoid electrostatic charge build-up, the fibers were first coated with a thin layer of platinum. The rather broad character and lack of uniformity are clearly visible. The fibers were produced with a polymer solution flow rate of 4.47mL/hr and two different chiral nematic mixtures as cores (ROTN:CB15 in ratio 65:35, flow rate 1.92ml/hr, and the same components in ratio 50:50, flow rate 2.43mL/hr), using a θ cross section glass capillary with inner diameter 1.4 mm and silica capillaries for the core fluids with outer diameter 350 μm and inner diameter 250 μm. The spinning distance was 9 cm and the voltage was 7 kV.

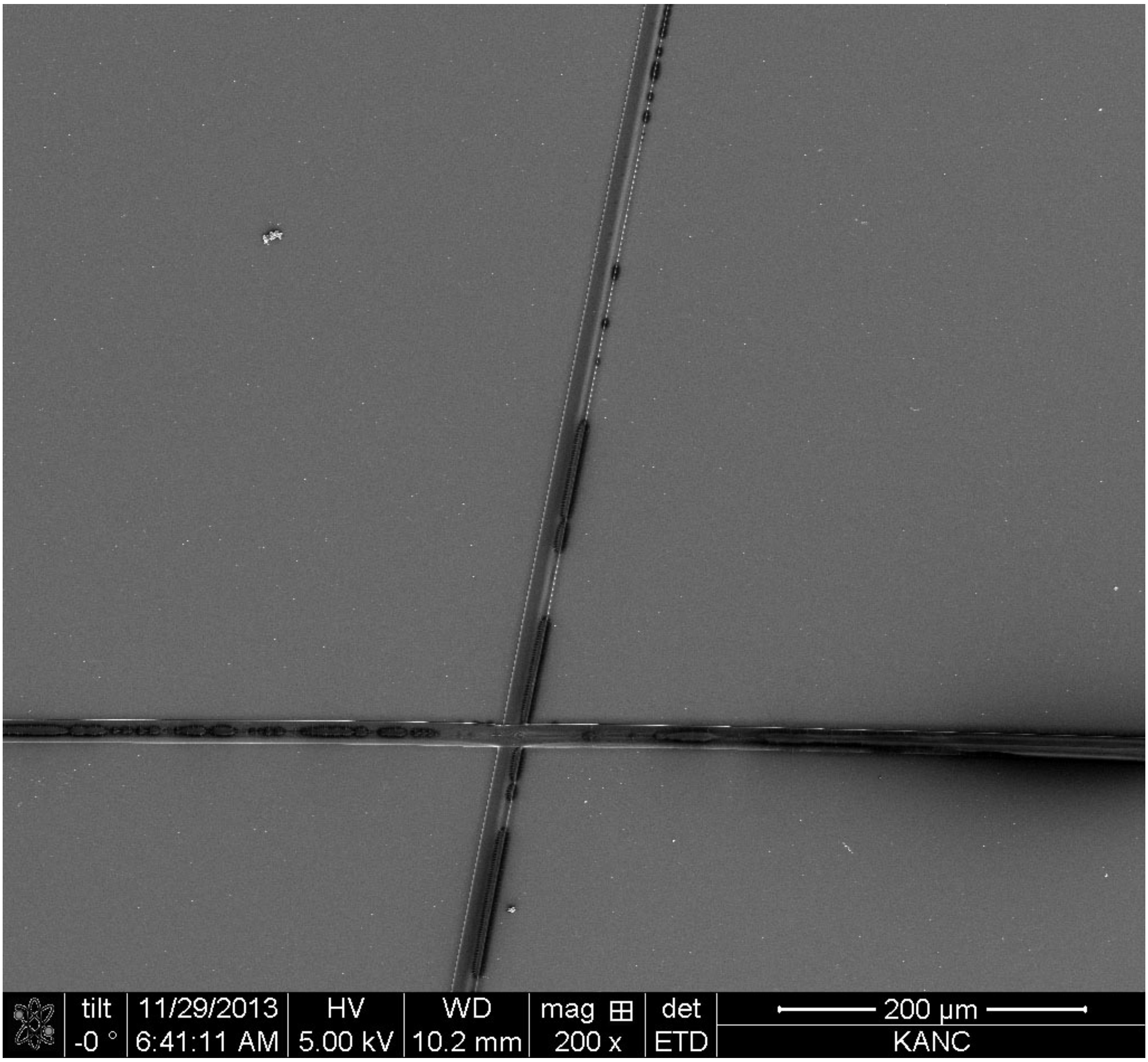

Fig. ESI 1.

A cross section of one such fiber is imaged by SEM in Fig. ESI 2. This was prepared in the same way as in the study [ESI 1], i.e. by Focused Ion Beam (FIB) lift-out. In order to support the structure from collapse during sectioning, the fibers were first covered by a second, thicker, layer of platinum, and then a thin slice was cut out by FIB which was attached to a TEM grid. This was then imaged by SEM, producing the picture in Fig. ESI 2.

Because the liquid crystal material evaporates in the high vacuum of the FIB and SEM, the core areas are recognized simply as holes in the structure. It is clear that the fiber has been strongly flattened, becoming very wide (the original fiber actually continued somewhat to the left of the produced section), and that multiple ill-defined cores are present. Considering that the Taylor cone indicated two well separated core flows being ejected into the jet, these findings suggest that the fibers underwent strong deformation, including core material mixing and redistribution, after deposition on the hydrophilic substrate. As discussed in [ESI 1] this can be understood as a result of capillary forces from the water condensed on the fiber during spinning, as it spreads on the substrate, away from the fibers.

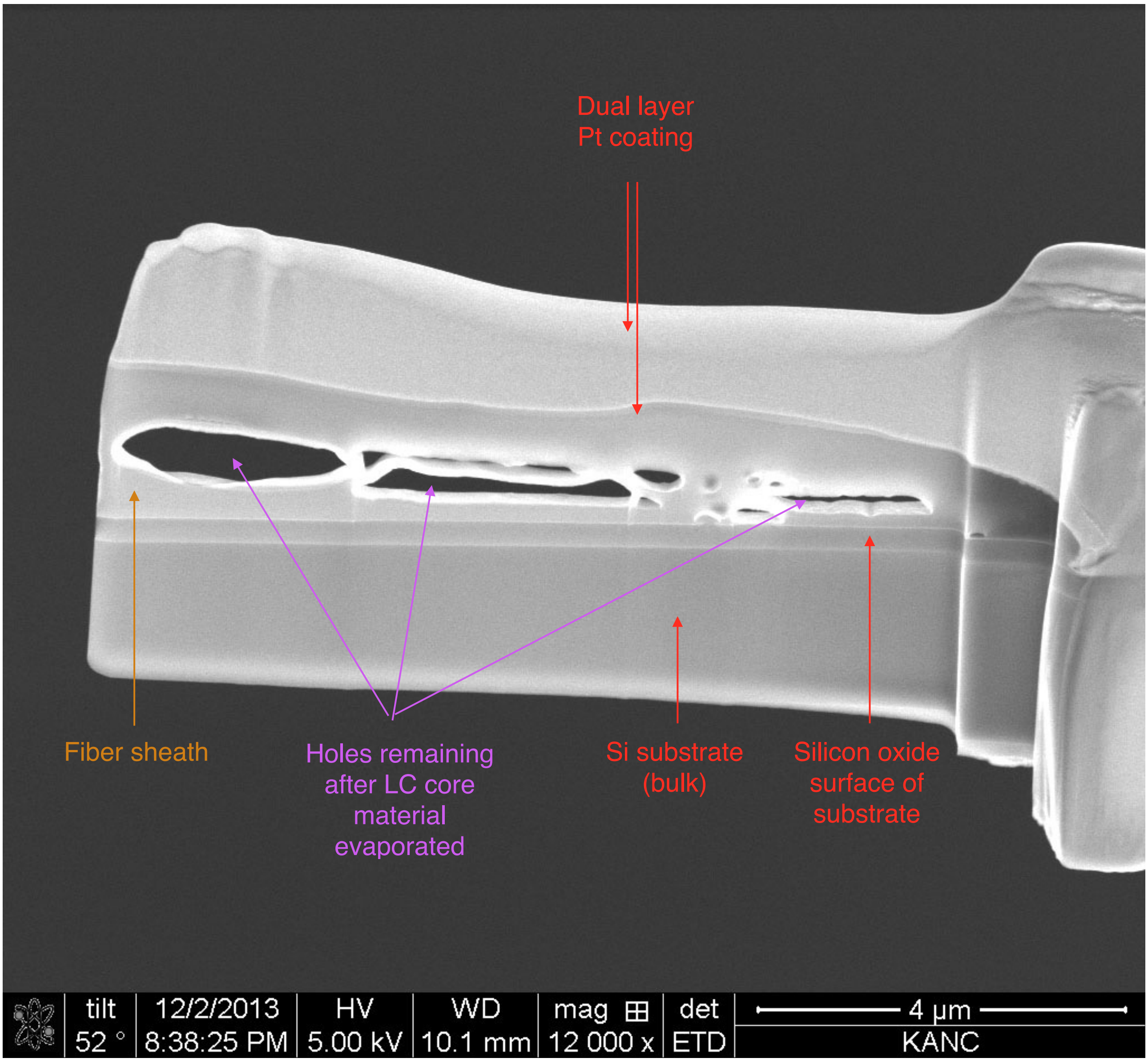

Fig. ESI 2.

Reference

[ESI 1] "Influence of Wetting on Morphology and Core Content in Electrospun Core-Sheath Fibers ", D.K. Kim, and J.P.F. Lagerwall, *ACS Appl. Mater. Interf.* **6**, *18*, pp. 16441-16447 (2014), DOI: http://dx.doi.org/doi: 10.1021/am504961k