Supplementary Information for

BIOPOLYMERIZATION-DRIVEN SELF ASSEMBLY OF NANOFIBER AIR-BRIDGES

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This first section describes our original observation of the biopolymerization of a protein fiber. We assumed the fiber was likely to be fibrin, and this motivated us to attempt making fibrin air-bridges from pure extracts of fibrinogen and thrombin by the brush on method. Figure S1 shows a portion of the fiber that formed during these measurements together with AFM Force-Distance (F-D) retraction scans. For the earliest recorded curve (580 s after the drop of blood is placed on a depression microscope slide and 2 minutes after being drawn) the probe tip breaks free from the surface of the plasma (at about 2.7 μm extension distance of the scanner) producing a clear stair step response as the AFM probe returns to a zero force condition. In later scans there continues to be an attractive force beyond the stair-step which increases with time. Eventually this force dominates over the stair-step feature indicating a thickening and lengthening of a structure on the end of the AFM tip. The scanning electron microscope (SEM) images in Fig. 2(A),(B) shows that a fiber of ~ 100 nm diameter has formed. The fiber as observed at lower magnifications was about 6 μm long, but broke off in handling inside the SEM chamber.

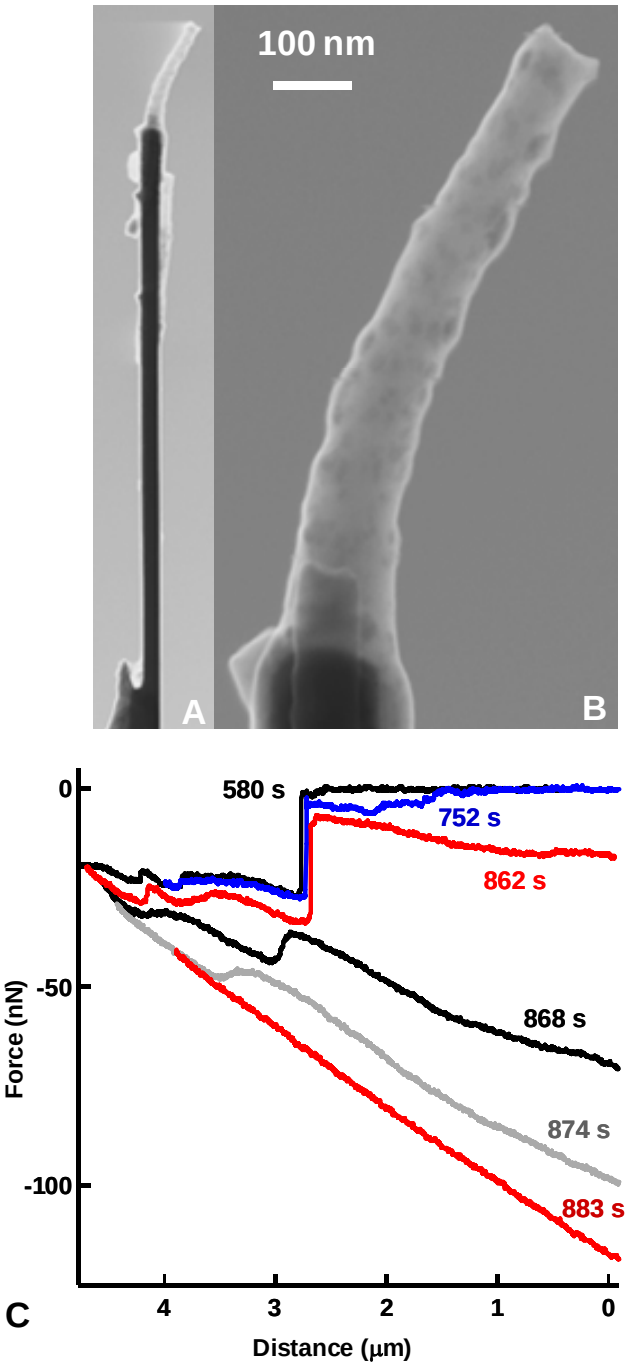

Figure S1. Growth of protein nanofibers from a solution of (A, B) blood serum obtained by retracting the constant diameter AFM tips. B is a magnified image of A. (C) Force-distance curves obtained as the needle-tipped AFM probe is retracted from a solution of human blood plasma. In order to simplify interpretation the scans, as plotted, have been translated leftwards by increasing amounts (on the order of 1 μm) with time in order to compensate for changes in the surface height due to evaporation.

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This second section provides wide-area views that demonstrate the long range order and low defect count produced by the brush on process of the thrombin-fibrinogen system. Due to the excessive detail these images would not reproduce well in journal format and therefore are presented here in further support of the method.

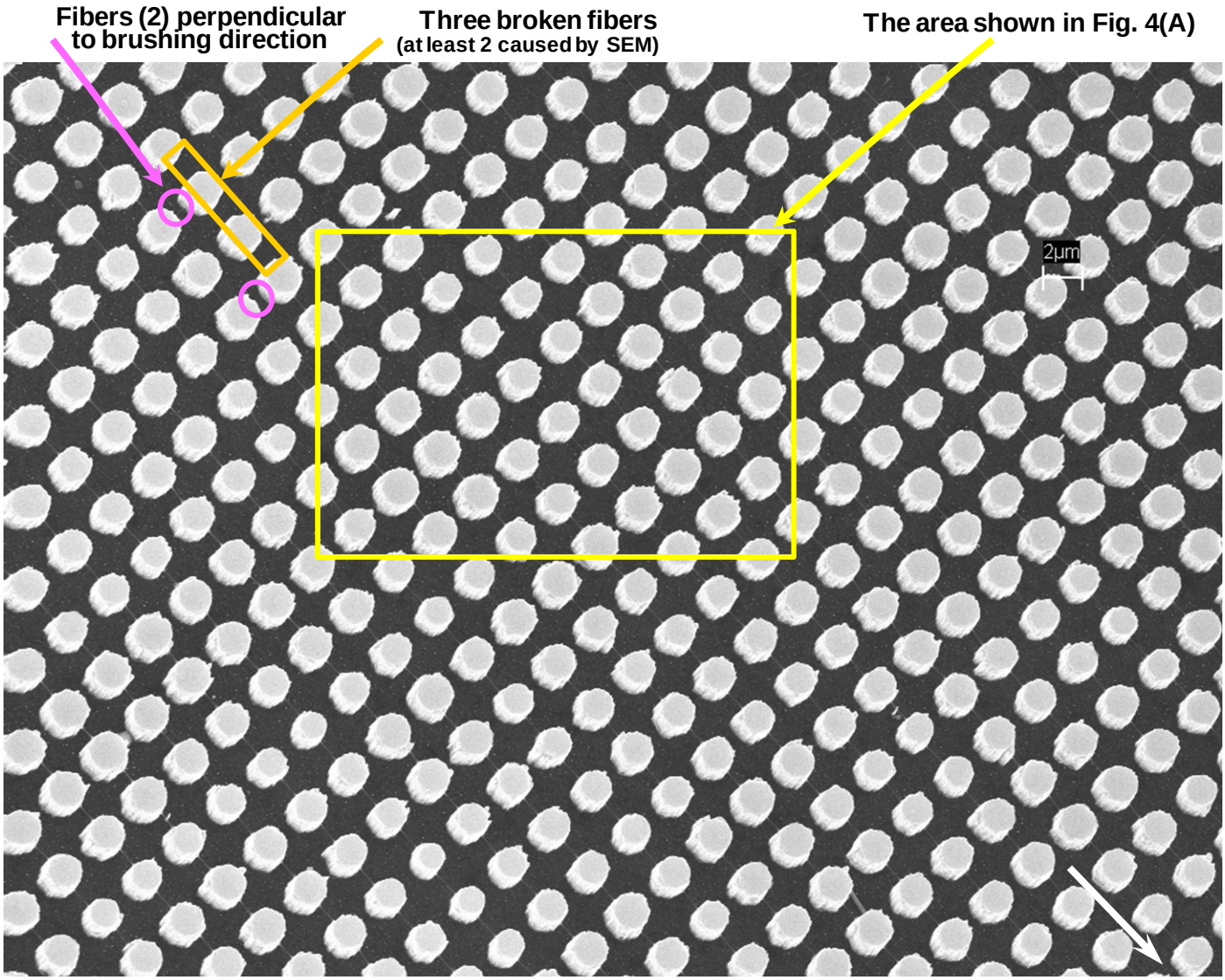

Figure S2. Wide field SEM image (48 x 62 µm area) of the same sample of fibrin fiber air-bridges as in Fig. 3(A) including annotation of defects.

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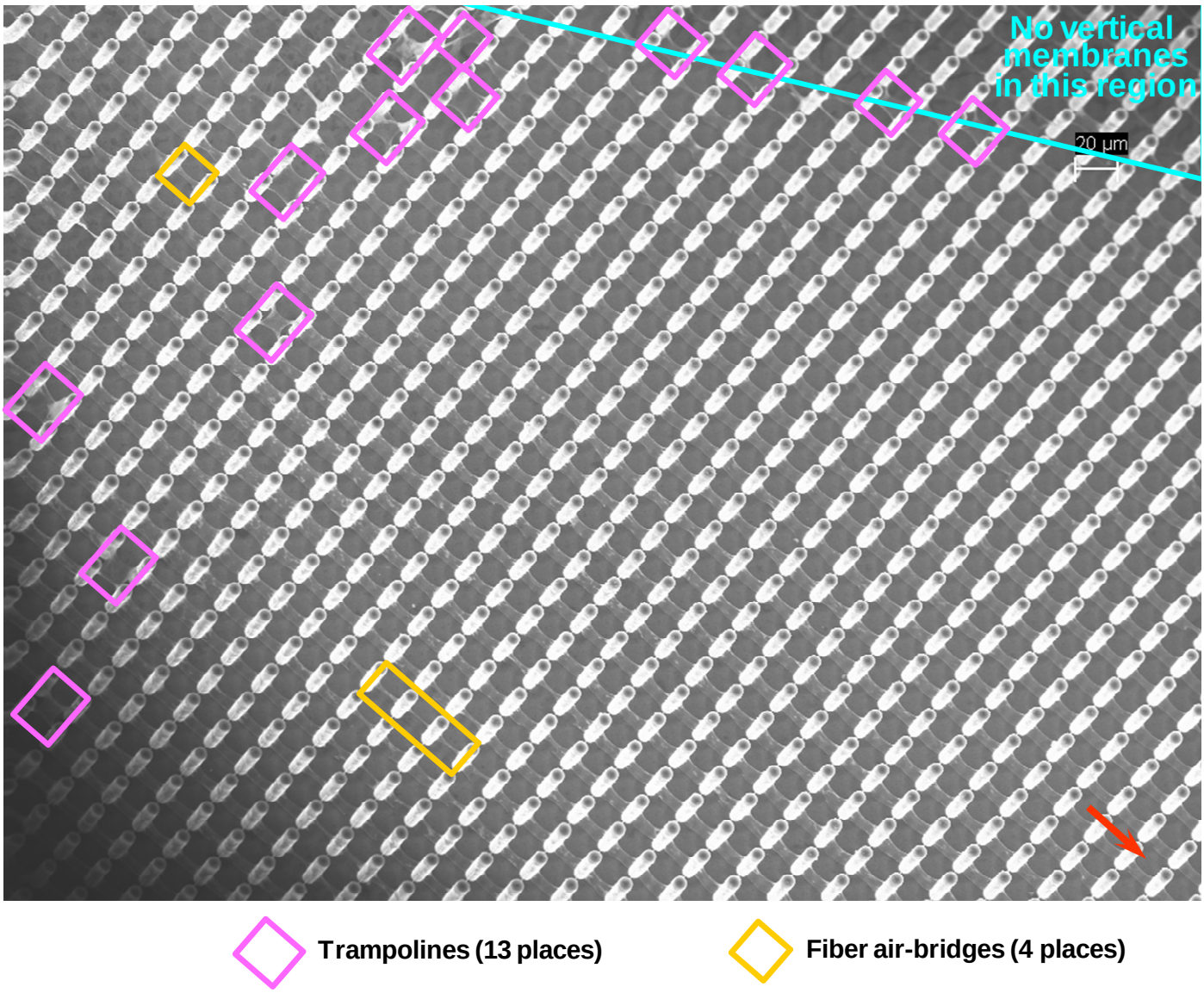

Figure S3. Wide field SEM image (550 x 400 µm area) of the same sample of fibrin septums as in Fig. 5(A). Annotations indicate defects and the edge of the region of septums.