Supplementary Materials

Synthesis and Characterization of Non-linear Nanopores in Alumina Films

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Figure 1S. A photograph of an electropolished aluminum substrate shows extremely smooth and high reflectivity of polished surface. The image of the camera with which this photograph was taken is also seen in the photograph.

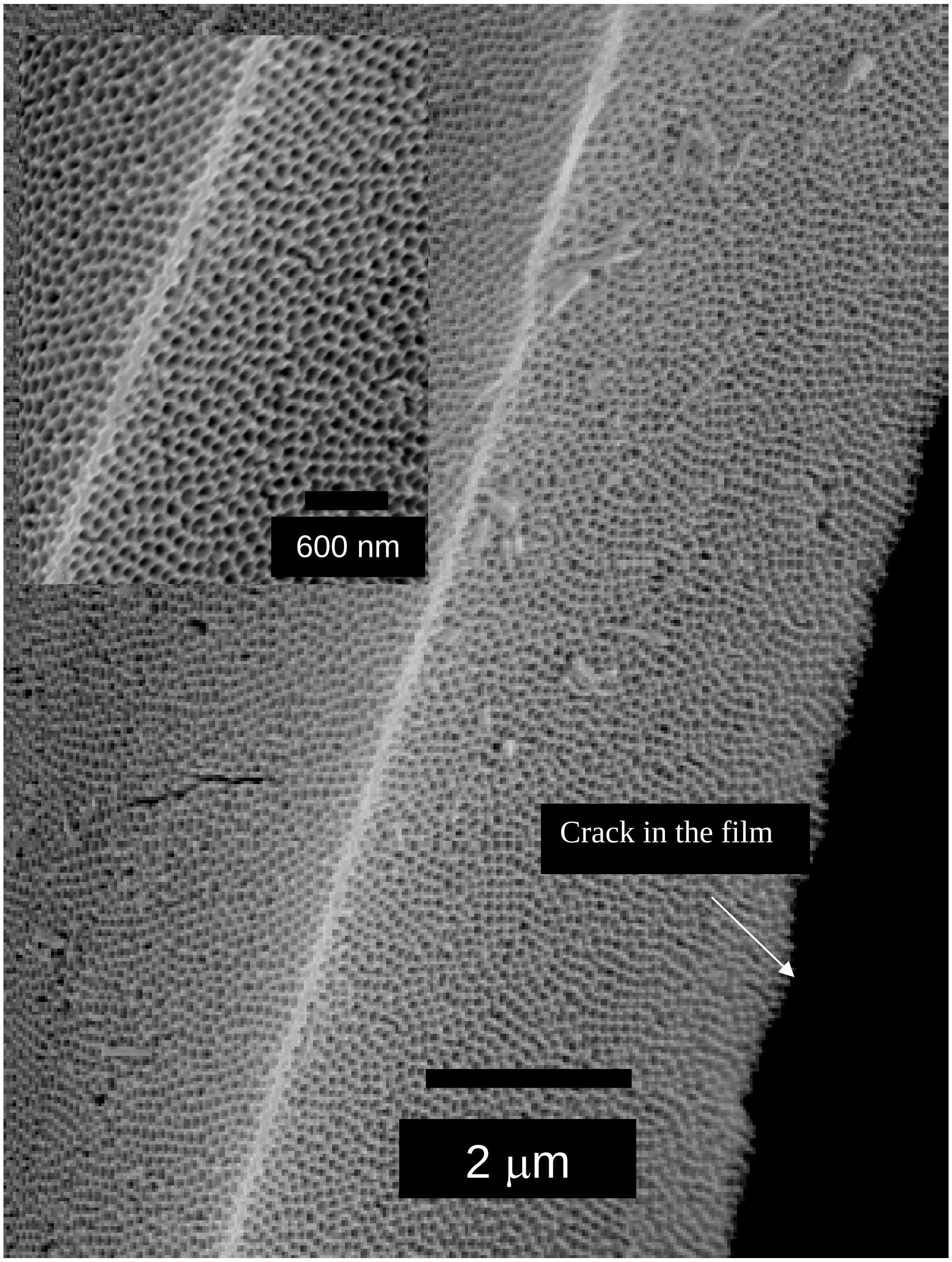

Figure 2S. SEM of the nanoporous alumina whose pores orientation on two facets are perpendicular to each other. The alumina film is anodically formed on a 1 mm x 10 mm aluminum foil at 45 V under the same conditions as reported in the main text. The thickness of the substrate is ~200 micron. We also observed cracks in the center of the 200 micron x 1000 μm face. The cracks were not observed at the sharp edges. It appears that the dimension and shape of the aluminum substrate may have some effect on the location of stresses generated, ultimately affecting the location of the cracks in the film. This point is discussed in some detail in the main text.

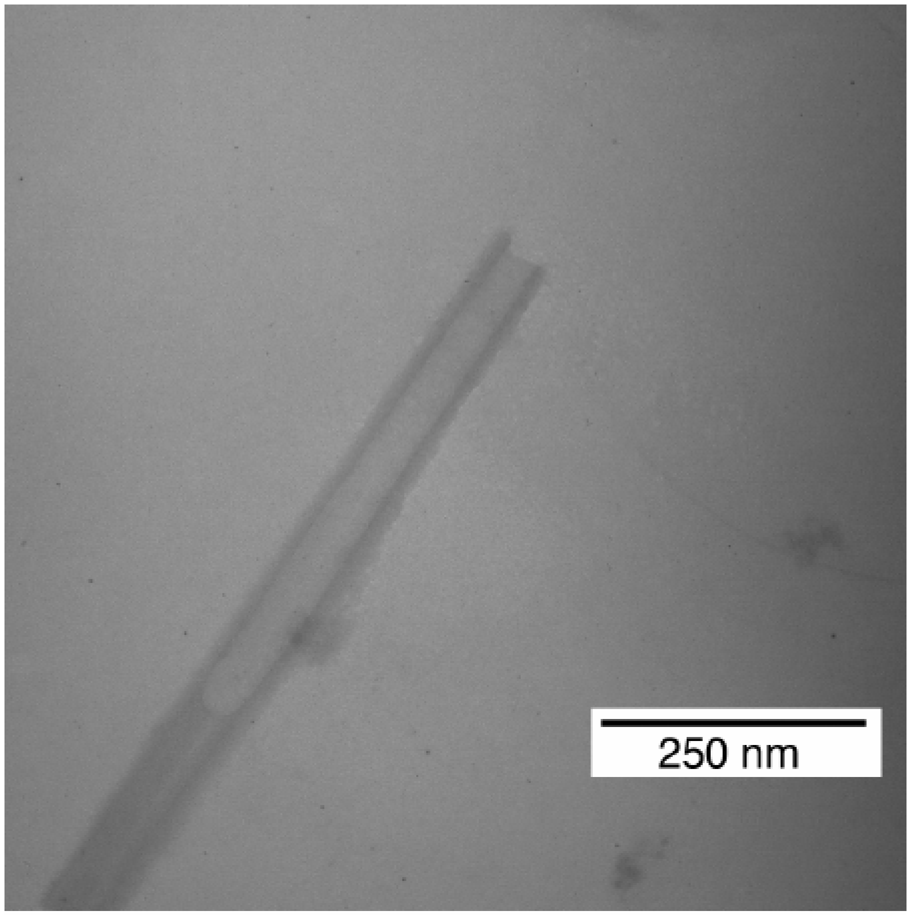

Figure 3S. TEM of hollow silica nanotube synthesized using a sol-gel procedure in the alumina films. The thickness of the nanotube wall of about 3-6 nm.

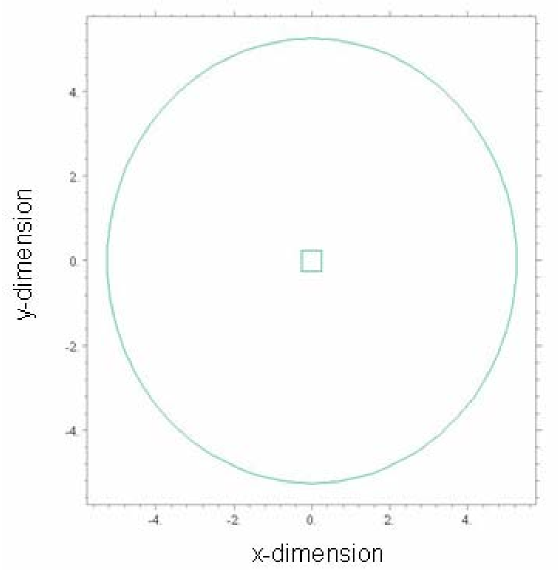

Figure 4S. The space domain used in electrical field calculation. The electrical field is obtained by solving Laplace equation using a finite element tool FlexPDE. A 2D model is used in the computation. The outer cycle in the figure represents the cylindrical cathode and the square in the center is the anode. The diameter of the cycle is 10.5 mm and the size of the square is 0.5 mm x 0.5 mm. The potentials of the anode and cathode are set to 60V and 0V, respectively. These parameters are the same as those in the experimental setup.

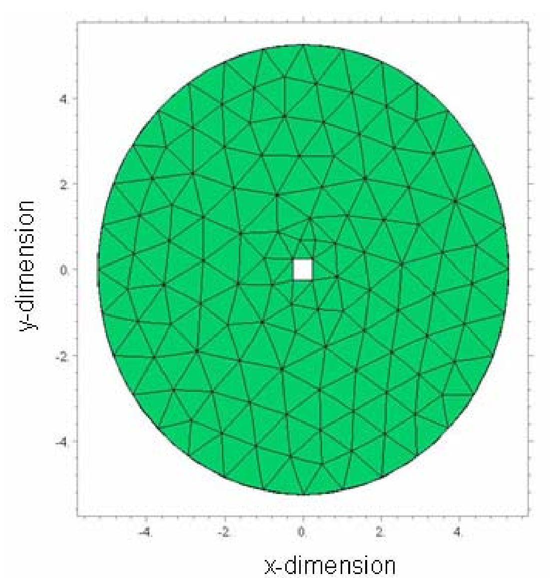

Figure 5S. The mesh used in solving Laplace equation. It is automatically generated by the FlexPDE solver.

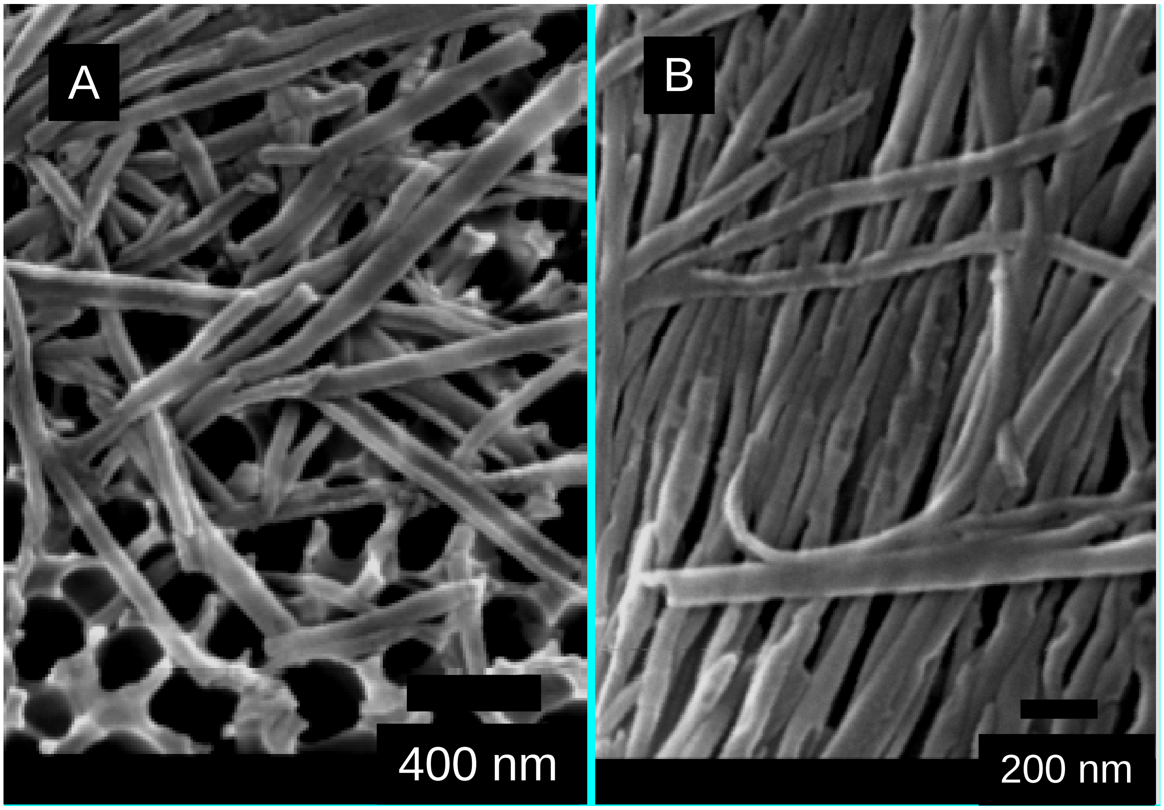

Figure 6S. SEMs of template-synthesized dendritic silica nanotubes. A high degree of branching can be seen in these electron micrographs. Further, because of extremely thin wall thickness, these nanotubes appear to be very fragile as is evident from broken nanotubes.