

Synthetic Single Nanopore and Nanotube Membranes  
C. Chad Harrell, Sang Bok Lee, Charles R. Martin  
Department of Chemistry and Center for Research at the  
Bio/Nano Interface  
University of Florida PO Box 117200  
Gainesville FL, 32611-7200

There is increasing interest in investigating transport and electrochemical phenomena in synthetic membrane samples that contain a single pore of nanoscopic diameter. Approaches used to date for preparing such single-nanopore membranes include microfabrication-based methods, the track-etch method, and a method based on the incorporation of a single fullerene nanotube within a synthetic membrane. We describe here an alternative approach that we believe is easier and more accessible than the previously described methods. This method is based on a very low pore density track-etch membrane obtained from commercial sources. Fluorescence microscopy is used to identify and isolate a single nanopore in this membrane. Membrane samples containing single nanopores with diameters as small as 30 nm have been prepared. Furthermore, we show here that an electroless plating method can be used to deposit a gold nanotube within the single nanopore, and this provides a route for further decreasing the inside diameter of the pore. A single nanotube membrane with an electrochemically-determined inside diameter of 1.9 nm was prepared and evaluated.

References:

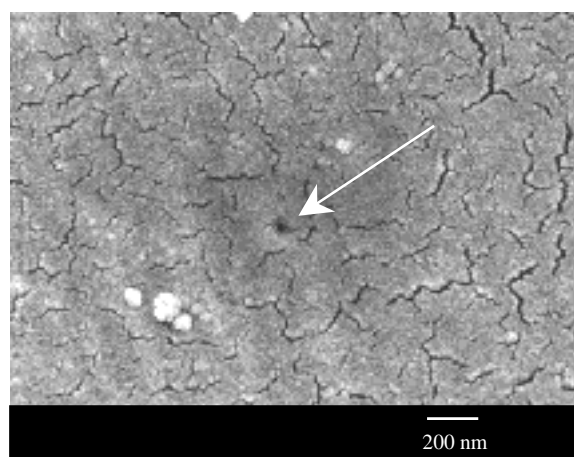
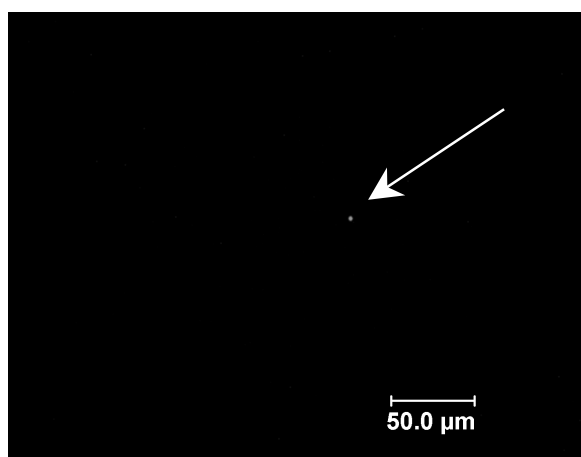
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(a) A fluorescence image of a single 30 nm pore isolated using the isolation process. (b) A scanning electron micrograph of the same single 30 nm pore isolated using the isolation process.