

Template Synthesis of Arrays of Nano Fuel Cells  
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Fuel cells are an attractive technology to replace batteries in portable power sources. However, most devices for which fuel cells are being considered (*e.g.* mobile phones and laptop computers) require voltages much higher than that produced by single fuel cells. This requires that several fuel cells are wired in series to provide the necessary voltage. Stacking cells as is done in large fuel-cell systems requires fuel and oxidant manifolds and bipolar plates between each cell.

In this paper a template method which is used to synthesize arrays consisting of *ca.*  $10^9$  nanosized PEM fuel cells is described. The individual cells are cylindrical with a diameter of *ca.* 200 nm and *ca.* 20 – 50  $\mu\text{m}$  long.

An alumina membrane filter with pores 200 nm in diameter is filled with a solution of solubilized Nafion® and platinum is either electroplated or electrolessly deposited at the ends of the pores forming an array of nano fuel cells.

The nanoscale size of the fuel cells results in the current-collector footprint being the critical dimension defining the fuel-cell bundle dimensions. This feature allows bundles of cells to be easily wired in serial without stacking fuel-cell membranes and without the need for fuel and air manifolds or bipolar plates.