

## **Array Fuel Cells for High Throughput Evaluation of Fuel Cell Components**

Eugene S. Smotkin

NuVant Systems Inc., 10 West 33<sup>rd</sup> Street, Chicago, IL 60616

The preparation of membrane electrode assemblies requires optimization of a number of interfaces prepared from catalyst inks, modified gas diffusion layers and the polymer membrane electrolyte. The application of design of experiments optimization of these interfaces requires high throughput membrane electrode assembly evaluation instrumentation. NuVant Systems Inc. has developed array fuel cells for both liquid and gas fed membrane electrode assemblies. The essence of the array fuel cell is a segmented array fuel cell electrode on one face of the Nafion membrane opposite a large counter/reference electrode. Standard MEA preparative methods are used. Key issues in the development of such instrumentation are uniform flow and a method to correct for depletion of reactants in the array flow field. Uniform flow is addressed by establishing a pressure drop at the inlet of an array flow field. Reactant depletion is addressed by a fuel cell array row switching mechanism.

In addition to the screening of catalysts, the array fuel cell is ideal for evaluating MEA preparative methods. Array data will be presented that shows current response surfaces that quantitatively show that although increased loading increases the current density (up to a limit) the utilization of the catalysts is compromised. Other applications of array fuel cells will be discussed.