

Wed, Apr 13th, 2005, Millis 123 10-11 am

The Oxygen Electrode in Fuel Cells: It's not Just Hot Air!

Dr. Viola Birss

**Canada Research Chair
(Electrochemistry of Materials for Fuel Cells and Related Energy Applications)**

**Department of Chemistry
University of Calgary
Calgary, Alberta Canada**

One of factors hindering the implementation of fuel cells as efficient energy conversion devices is the poor performance of the cathode, at which the reduction of molecular oxygen occurs. In contrast, the oxidation of fuels such as hydrogen is generally a rapid reaction and hence the anode is not normally performance limiting. For example, when the most active cathode catalyst, Pt, is used in low temperature proton exchange membrane fuel cells, approximately 25% of the cell potential is lost at the cathode even before any measurable current is generated. Similarly, in high temperature solid oxide fuel cells (SOFCs), which offer great promise in stationary applications due to fuel flexibility and high energy conversion efficiency, the performance and power density are again limited by the slow kinetics of the oxygen reduction reaction. This talk will focus primarily on the evaluation and enhancement of the kinetics of the oxygen reduction reaction at SOFC cathodes, particularly at Mn-oxide and other perovskite materials. In addition, challenging issues related to establishing the mechanism of the oxygen reduction reaction, and the possible effect of cathode porosity on the measured reaction rate, will be presented. Finally, as fuel cells must not only generate high power, but must also be durable, the degradation of the cathode due to poisoning by volatile species generated by stainless steel interconnects will be discussed.