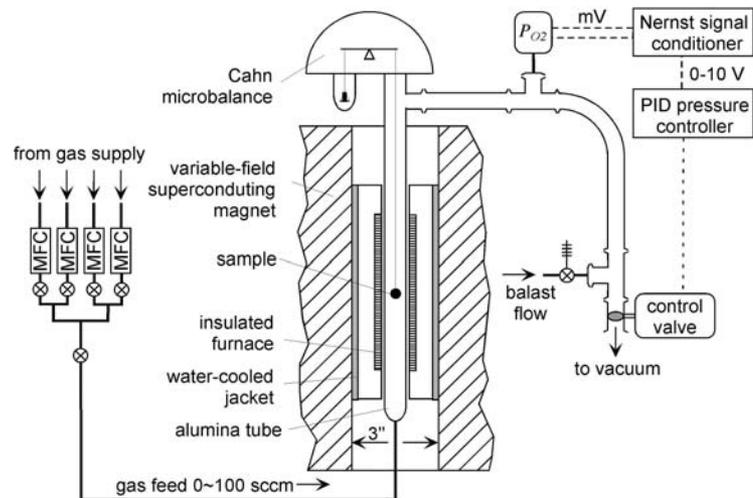
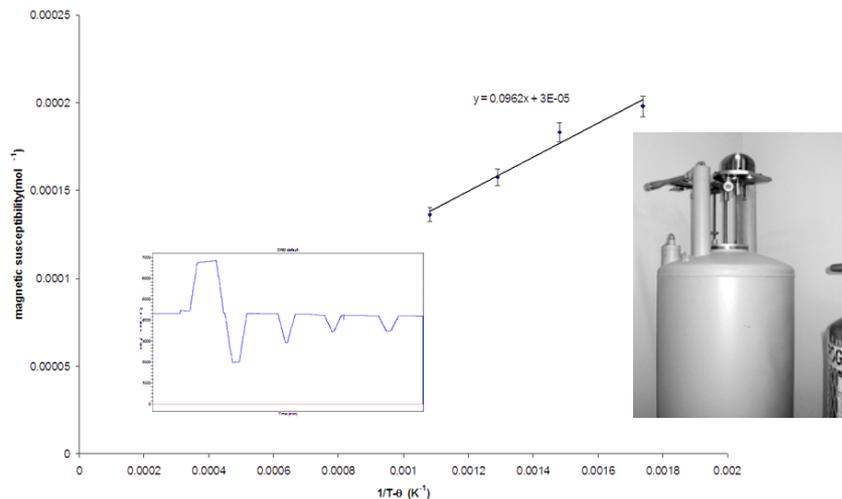


Electrochemical Ceramics - Understanding the Gap between Localized and Collective Viewpoints of Electronic Structure

Dinesh Baskar, Stuart B, Adler, Univ. Washington, DMR-0222002

Solid Oxide Fuel Cells and other related devices utilize *electrochemical ceramics*, which conduct electrons and ions at high temperature. The properties of these materials depend strongly on their electronic structure, which falls somewhere in-between that of a semiconductor or metal. We have built a high-temperature, controlled atmosphere faraday balance, which allows us to probe the electronic structure via magnetic properties. Our preliminary measurements suggest that materials with formally “metallic” band structure contain significant numbers of localized defect impurity states, which moderate their properties.



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Education:

To date this project has involved one MS/PhD student (Dinesh Baskar) and one undergraduate (Ryan Reed). This CAREER award also involves an educational development project, which seeks to more closely integrate teaching and research. A new laboratory module will be developed in FY '05, for undergraduates to do hands-on experiments with contemporary fuel cell materials. This work will also contribute to the PI's internet-based distance-learning course CHEME 446, Fundamentals of Solid Oxide Fuel Cells.

Outreach:

PI Stuart Adler and his students participate actively in educational outreach. Dr. Adler was the organizer for the 2002 Chemical Engineering open house at UW, which hosted approximately 3000 Seattle-area elementary and high school students.