

# T<sub>c</sub>SAM Special Seminar

Texas Center for Superconductivity and Advanced Materials



## Prof. U. (Balu) Balachandran

Manager, Ceramics Section  
Argonne National Laboratory

## “Hydrogen Economy: Status of Science & Technology and R&D Opportunities”

**Friday, November 12, 2004**

Room 102, University of Houston Science Center  
2:00 p.m. – 3:00 p.m.

### Abstract

Hydrogen is considered the fuel of choice for both the electric power and transportation industries because of concerns over global climate change. Dependence on depleting oil reserves found in politically unstable regions of the world is forcing many nations to look into the so-called hydrogen economy – a solution that holds the potential to provide sustainable clean, secure, affordable, and reliable energy. At present, petroleum refining and the production of ammonia and methanol collectively consume  $\approx 95\%$  of all deliberately produced hydrogen in the U.S. Most of the demands for hydrogen are currently met by fossil-based technologies such as steam reforming of methane, naphtha reforming, and coal gasification. New cost-efficient production pathways will be needed as we move into the hydrogen-based transportation system. Present needs include economically viable and environmentally benign sources for hydrogen, safe and efficient storage, infrastructure for delivery, and utilization technologies. Also needed are establishment of safety codes and standards, and public training/acceptance. Materials science will play a major role in addressing the challenges of the hydrogen economy. The current status of the hydrogen production, storage, distribution, and utilization technologies will be reviewed. Topics addressed will include membranes for hydrogen production/separation, thermo-chemical water splitting, and technical barriers/research opportunities.

\*Work supported by the U.S. Department of Energy.

### Bio

Dr. Balachandran has been doing research in the area of electronic materials for over 25 years. He received his Ph.D. in Materials Science in 1980. His current interests include high-temperature superconductors and dense membranes for gas separation and natural gas upgrading. He is a Fellow of the American Ceramic Society and currently the Manager of the Ceramics Section at Argonne National Laboratory. Dr. Balachandran has authored/coauthored more than 200 papers, edited 11 books, and holds 27 patents. He has won three R&D 100 Awards, two Federal Laboratory Consortium (FLC) Awards for Excellence in Technology Transfer, two FLC Awards of Merit, four Pacesetter Awards, three Director's Awards, and the University of Chicago's Distinguished Performance Award (the highest honor offered at ANL for scientific achievement).

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