

# Pan-American Advanced Studies Institute on Materials for Energy Conversion and Environmental Protect

## Photos

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## Organizers

- R.P.H. Chang, Materials Research Institute, Northwestern University, US
- Guillermo Solorzano, Catholic University of Rio de Janeiro (PUC-Rio) and Brazilian Society for Materials Research (Brazil-MRS), Brazil
- Wolfgang Sachtler, formerly of Northwestern University, US
- Roberto JJ Williams, National University of Mar del Plata and National Research Council (CONICET), Argentina
- Subhash Singhal, Pacific Northwest National Laboratory, US
- Harold Kung, Northwestern University
- Fernando Lund, Center for Advanced Interdisciplinary Research in Materials (CIMAT), Chile
- Caribay Urbina, Center of Electro-Microscopy, Brazil

## SponsorsNational Science Foundation, US Department of Energy, US

Army Research Office, US

## Overview

The Pan-American Advanced Studies Institute (PASI) on Materials for Energy Conversion and Environmental Protection was held October 20-29, 2003 in Rio de Janeiro, Brazil. Co-sponsored by the National Science Foundation (NSF), the Department of Energy (DOE), and the Army Research Office (ARO), the event welcomed twenty distinguished lecturers and forty graduate and post-doctoral students. By nationality, participants represented Argentina, Bolivia, Brazil, Canada, Chile, Mexico, Peru, Panama, the United States (including Puerto Rico), and Venezuela. Technical sessions covered topics related to Fuel Cells and Catalysis for Emissions Control. Eight Pan-American student research groups were created, each with a Joint Collaborative Research Plan to perform collaborative research in these areas.

Lecturers came from industry, academia, and government. Advanced graduate and postgraduate students were recruited from the physical sciences and engineering fields, half from the US and the other half from outside the US. Students were assigned into international teams of five, each led by a US co-leader and a Pan-American co-leader.

The innovative PASI program maximized interactive learning. Teams made initial contact before the PASI, and identified potential research topics based on their common interests. Once at the PASI, lecturers mentored the students, helping them set goals, make budgets, and plan effective use of facilities. Team research plans included: rationale and intellectual merit for proposed research, division of tasks, facilities sharing, unique team strengths, challenges inherent in the global project and possible solutions, projected applications and technology transfer strategies, budget and broader impact.

One-hour technical and policy lectures were followed by 30 minute question & answer periods. Each afternoon, students met with lecturers during 90-minute roundtable discussions. Students made their presentations and received feedback regarding project feasibility, budget planning, challenges, and additional methods of approach. The last 4 days of the PASI coincided with the opening of the second annual meeting of the Brazil Materials Research Society (Brazil-MRS), held at the same locale. PASI participants received complementary registration for this event and were encouraged to attend lectures and exhibits.

The main deliverables of the PASI were: (1) Advanced Technical Lectures (2) Improved global skill set for students (3) Eight Pan-American student research groups, each with a clearly defined Joint Collaborative Research Plan. Student and lecturer feedback was overwhelmingly favourable. Many students plan to continue their collaborations and implement their planned research. Lecturers were very pleased with the student projects and some even offered to look into internships, institutional funding and lab use to help the students implement their projects. Overall, both groups were very pleased with the prospects for fruitful collaborations.

Plans are underway to help PASI students implement their research plans. Students also have the opportunity to develop the PASI website, hosted at Northwestern. It is hoped that this program can serve as an effective model for other educational and networking events around the world. To this end, three African scientists attended the PASI through an NSF supplement, with a view to establishing similar institutes in their regions.

## Lecturers

- John C. Amphlett (Royal Military College, Canada)
- Fernando Baratelli Junior (Petrobras R,D&E Centre, Brazil)
- Ernesto Calvo (Universidad de Buenos Aires, Argentina)
- Virginia Ciminelli (Universidade Federal de Minas Gerais, Brazil)
- Carlos R. Cabrera (University of Puerto Rico, Rio Piedras)
- Robert Davis (University of Virginia, US)
- Mildred Dresselhaus (Massachusetts Institute of Technology)
- James A. Dumesic (University of Wisconsin, US)
- Robert Farrauto (Engelhard Corporation, US)
- Denis J. Miller (Michigan State University, US)
- Nguyen Minh (Honeywell, Inc., US)
- Raul Quijada (University of Chile)
- Fabio Ribeiro (Worcester Polytechnic University and Purdue University)
- Martin Schmal (COPPE/UFRJ, Brazil)
- Brent H. Shanks (Iowa State University, US)
- Subhash Singhal (Pacific Northwest National Laboratory, US)
- Susan M. Stagg-Williams (University of Kansas, US)
- Paulo Emilio Valadao de Miranda (COPPE/UFRG, Brazil)
- Roberto Villas Bôas (International Materials Assessment and Application Centre -IMAAC/UNIDO, Brazil)
- Wayne Worrell (University of Pennsylvania, US)
- Miguel Jose-Yacamán (University of Texas at Austin, US)

## PASI Student Research Projects

- Team 1: Novel Perovskite Based Catalysts
- Team 2: Development of new ethanol steam reforming catalyst
- Team 3: Nano-Porous Alumina for Fuel Cell Enhancement
- Team 4: Block Copolymer Assisted Self-Assembly Of Nanoporous (La<sub>0.6</sub>Sr<sub>0.4</sub>) (Fe<sub>0.8</sub>Co<sub>0.2</sub>)O<sub>3-d</sub> Cathodes For SOFC
- Team 5: Studies of SOFC Electrode Materials Using a Single Atmosphere Fuel Cell
- Team 6: Medium Temperature Proton Exchange Fuel Cells Using Composite Membranes
- Team 7: Movement toward the hydrogen economy based on fuel derived from biomass utilized in a reduced cost PEM fuel cell
- Team 8: Integrated Micro-Reformer and Separator for Portable Production of High Purity H<sub>2</sub>

## Resources

### Lectures

### Program

### Report