



## NSF WORKSHOP

# “Future Directions in Catalysis Research: Catalysts That Function at the Nanoscale”

June 19-20, 2003

NSF Headquarters

**WELCOME!**



## Welcoming Remarks:

- Dr. Glenn L. Schrader, Program Director  
Kinetics, Catalysis & Molecular Processes,  
Division of Chemical & Transport Systems
  
- Dr. Esin Gulari, Division Director  
Division of Chemical & Transport Systems
  
- Dr. Arthur B. Ellis, Division Director  
Division of Chemistry



## NSF CATALYSIS RESEARCH:

- LONG TERM, BASIC RESEARCH
- FUNDAMENTAL, INTEGRATED SCIENCE
- INTERDISCIPLINARY (CTS, CHEM, BES, BIO)
- NSF COMMITMENT TO SUPPORT/WORKSHOPS
- KEY TO NEW TECHNOLOGICAL APPLICATIONS
  - Chemicals, pharmaceuticals, fuels
  - Environmental protection, benign processing
  - Fuel cells, hydrogen economy
  - Sensors
  - New materials (nano-materials and devices)
  - Biotechnology, biorenewables



## ECONOMIC IMPORTANCE OF CATALYSIS

- ~30% GDP attributed to processes relying on catalytic conversion
- 90-95% of new processes are catalytic
- Major technological innovations
  - ammonia synthesis
  - catalytic reforming
  - auto exhaust catalysts

**FOCUS IS ON THE FUTURE!**



## WORKSHOP STRATEGIES

Purposes:

- Identify the fundamental research needs
- Define potential technology advancements that have a reasonable probability of being achieved and that could have great societal impact
- Formulate long term visionary challenges

**WHAT SHOULD THE RESEARCH AGENDA FOR NANOSCALE CATALYSIS BE FOR THE NEXT 10-15 YEARS?**



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### Organizers:

Professor Mark E. Davis

Department of Chemical Engineering

California Institute of Technology

Professor Don Tilley

Department of Chemistry

University of California-Berkeley