

VI.G.5 Fundamental Research for Optimization of Hydrogen Storage and Utilization*

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Projected End Date: September, 2006

**Congressionally directed project*

Objectives

- Perform fundamental physics and chemistry investigations of hydrogen absorption/desorption in various matrix materials of various forms and with various dopants in a coordinated project of theoretical and experimental tasks to establish a solid fundamental base of understanding to point the way to an optimal solid-state storage concept.
- Perform fundamental theoretical investigations of the catalysis of hydrogen adsorption and dissociation on platinum substrates to develop better understanding of the role of surface characteristics and contaminants on the performance of hydrogen fuel cells.
- Perform fundamental theoretical investigations of collision rates among atomic and molecular hydrogen in thermal and nonthermal populations to develop better understanding of fundamental hydrogen combustion processes as well as thermal effects on fuel cell performance.

Approach

The purpose of the project is to develop a fundamental understanding of the interaction of atomic and molecular hydrogen with materials pertinent to the storage and utilization of hydrogen, thus enabling improved concept development, design and testing of storage options, fuel cells and hydrogen combustion applications. The primary goal of the project during this project period is to create the framework for an interdisciplinary academic research center that combines theory and experiment in order to address specific aspects of hydrogen storage and utilization. The project will emphasize fundamental research at the atomic and molecular levels to understand the mechanisms of hydrogen adsorption/desorption from potential storage materials, catalysis of hydrogen adsorption and dissociation on platinum surfaces (fuel cell applications) and rate coefficients for atomic and molecular hydrogen interactions in both thermal and nonthermal populations (hydrogen combustion applications).

Accomplishments

This project has just been initiated.