

Introduction to Exploratory Projects

Funding was recently made available for exploratory projects which are limited to a one-year performance period and \$100K. Exploratory research activities test the feasibility and application of potential step-out ideas using novel approaches and innovative concepts to reduce greenhouse gas emissions on a global scale. The preliminary results may support the submission of a detailed proposal.

The first projects funded under the exploratory program began in 2006, their progress and results are reported in the following pages. One project explores Advanced Thermionic Energy Converters (Cappelli). Thermionic energy converters (TEC) can serve as topping cycle devices in combustion systems or as the primary heat engine in solar thermal system. The work will test the feasibility of using a low power, continuous wave diode laser to dramatically increase TEC efficiency and power density.

Another project in advanced combustion is a Collaborative Research Effort on Integration of Coal Energy Conversion with Aquifer-Based Carbon Sequestration (Mitchell). The project will investigate the feasibility of a collaborative research effort between Stanford and Brigham Young University to addresses key research issues that need to be resolved for coal energy conversion with aquifer-based carbon sequestration technology.

A project explores Nanotube Networks as Transparent Electrodes for Solar Cells (McGehee, Goldhaber-Gordon). CNT-based electrodes have several potential advantages over standard transparent electrodes including an extraordinarily large electron mobility, increased contact area, and higher flexibility. The project will study the influence of film roughness on charge collection, film adhesion on the polymer layer, and film work function of the polymer-based photovoltaics.