

Alternative Energy

Solar

(School of Engineering and Applied Science & College of Arts and Science)

Solar Dish

- Novel materials systems and processing for increased
- efficiency of photovoltaics.
- Quantum dots, organic molecules, laser texturing.
- Device fabrication, characterization and modeling.

Fuel Cells

(School of Engineering and Applied Science & College of Arts and Science)

- Electrocatalysts for PEM fuel cells
- Hydrogen, nanoscale catalysts and fundamental principle modeling
- Solid Oxide Fuel Cells- flexible fuel sources, high T membranes

Alternative Fuels & Distributed Power

(School of Engineering and Applied Science, Facilities Management)

- Biofuels from Algae
 - Growth parameters to improve percentage of oil
 - Input of solid waste and CO₂
 - Extraction methodologies
- Gasified coal
- Microturbines and multi-fuel combustion

Catalysis

(School of Engineering and Applied Science & College of Arts and Science)

- Enhanced conversion of biorenewable resources
- Heterogeneous catalysis for fuels and chemicals
- Development of fundamental understanding, reaction kinetics & modeling
- Catalytic studies and modeling for fuel cells
- Homogeneous catalysis – methane to methanol

Wind

(School of Engineering and Applied Science)

- Turbine blade design
- Magnetic bearings
- Flow modeling for individual units and turbine farms

Hydrogen

(School of Engineering and Applied Science & College of Arts and Science)

- Thermochemical hydrogen production
- Hydrogen storage materials
- Fuel cell modeling

Secure and Safe Technologies for Nuclear Energy

(School of Engineering and Applied Science)

- Control room human/machine interface technology
- High performance simulation of power plant ops
- Digital instrumentation and control, advanced sensors, secure, wireless communication, fault isolation and assessment.

Energy Management and Conservation

- (Schools of Architecture, Engineering and Applied Science and Darden School of Business and Grounds-wide activities)
- Sustainable design of buildings, communities, and businesses
- Sensor arrays and feedback controls.
- Architecture/engineering EcoMod Projects
- Green urbanism, urban planning and policy, incorporation of local renewables
- Sustainable businesses, evaluation of entire supply chain.
- Transportation Systems
- Sustainable point-of-use water treatment technologies

Biorenewables

Expertise ranging from plant genetics and physiology through growth and separation to processing of fuels and chemicals. Funding on order of \$4m/year from DOE, NSF, Industry, State and University sources. Active research in Biology, Chemistry, Chemical Engineering, Civil and Env. Engineering, Commerce, and Env. Science.

Catalysis

- Reaction processes under study utilizing homogeneous and heterogeneous catalysis.
- Experimental and theoretical studies for conversion and processing to biofuels and chemical feedstocks.
- DOE EFRC- Center for Catalytic Hydrocarbon Functionalization (UVa lead)
- NSF ERC- Center for Biorenewable Chemicals (UVa partner institution)

Algae

- Growth parameters to improve percentage of oil, cultivation, separation, and extraction methodologies, utilization of waste streams, input of solid waste and CO₂ resulting in sequestration opportunities.
- Concurrent financial modeling and life cycle analysis.
- Manipulation and optimization of growth and fuel traits of plants for biofuels using plant genetics and physiology.