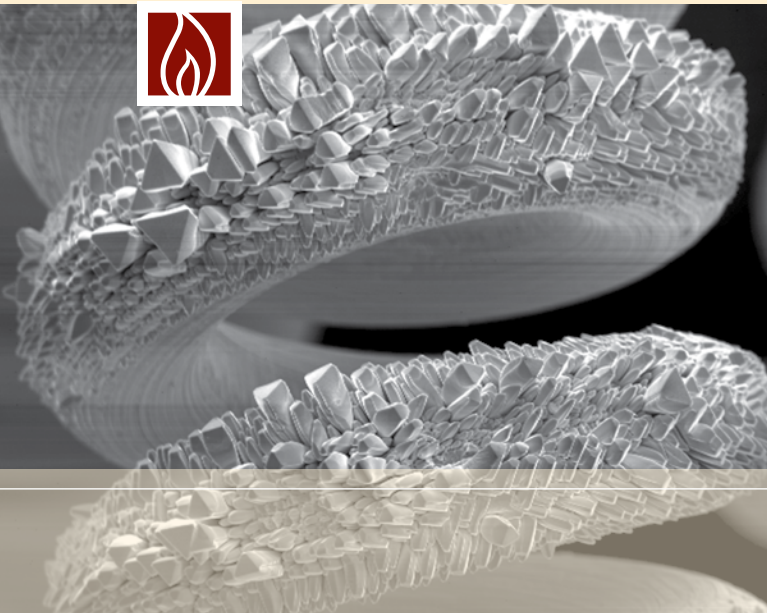




### ADVANCING ENERGY TOGETHER

The University of Wyoming School of Energy Resources is an interdisciplinary entity tasked with developing the fundamental knowledge, technologies and human resources necessary to solve the critical energy challenges society faces today. Each School of Energy Resources Center of Excellence serves as a hub to unite academia, government and industry in cooperation for the advancement of its focus area.

## School of Energy Resources



## Center for Photoconversion and Catalysis



## Center for Photoconversion and Catalysis

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The Center for Photoconversion and Catalysis (CPAC) promotes collaboration and experimentation in the fields of solar energy conversion, energy storage, and catalyst optimization. The goal of the center is to help Wyoming and the world develop a more sustainable and efficient portfolio of both renewable and conventional energy resources.

Faculty and students within CPAC work together to find new ways of generating and utilizing energy – emphasizing conversion of light into both electrical and chemical energy, as well as the closely related catalytic chemistry needed to utilize new and conventional energy forms more cleanly and efficiently. The resulting knowledge will help minimize energy losses and maximize yields in processes such as biomass conversion, the production of photogenerated fuels and the conversion of Wyoming's fossil energy sources into cleaner fuels.

The center targets research opportunities and challenges that lead toward a long-term vision for a future based on clean energy. Because solar energy and biofuels are emerging fields, CPAC and its partners expect to make groundbreaking advances in utilizing the planet's most abundant but underutilized renewable energy resources.

*CPAC is currently comprised of more than a dozen faculty with relevant research interests from departments including Chemical and Petroleum Engineering, Chemistry, Physics and Astronomy, Geology and Geophysics, and Electrical and Computer Engineering. Together, their activities include:*

#### RESEARCH

- Identifying affordable, efficient materials for storing renewable energy
- Optimizing catalysts in energy-related reactions to produce high yields and minimize both energy losses and unwanted by-products

#### OUTREACH

- Expanding the SHARK Project, which involves undergraduate and high school chemistry students in the process of finding stable metal oxide semiconductors that photoelectrolyze water
- Hosting seminars and workshops
- Promoting interaction among academic institutions, government and industrial entities
- Serving as a solar energy information resource for public officials and the general public in Wyoming and elsewhere

#### EDUCATION

- Creating and supporting educational opportunities that apply chemical principles to renewable energy
- Providing undergraduate, graduate and postdoctoral research and training experiences

#### RESEARCH AREAS

*Efficient generation of chemical fuels using solar photochemical systems*

- Direct conversion of sunlight to stored energy such as hydrogen from water
- Conversion of solar energy to liquid fuels using more efficient and less expensive catalysts
- Research into conventional and biofuel cells
- Catalysts for biomass conversion

*Efficient solar generation of electrical power using low-cost materials*

- Alternatives to current silicon photovoltaics
- Alternatives to element-limited photovoltaics (e.g. CIGS and cadmium telluride) by using semiconducting materials containing earth abundant elements
- Optimization of dye-sensitized solar cells

*Development of catalytic materials and systems for energy utilization and transformation*

- Alternatives to expensive, precious metal catalysts for energy associated reactions (e.g. water reduction, water oxidation, oxygen reduction, hydrogen oxidation, water gas shift reaction and methane reforming)
- Development of new catalysts necessary for fuel cells and biofuel cells
- Catalysts for biomass conversion

