

## Facilities

- A state-of-the-art solar cells research laboratory equipped with the necessary tools to synthesize and characterize crystalline and thin film silicon solar cells
- Two outdoor Photovoltaic modules testing facilities at KFUPM campus and KFUPM beach
- Residential solar water heater testing facility
- Fuel cell research laboratory including fuel cells and electro-chemical reactor system for carbon dioxide reduction.



## Manpower

In addition to full time researchers and supporting staff, there is a good number of faculty members and graduate students from different departments at KFUPM who are conducting research in affiliation with the center.



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Center of Research Excellence in  
Renewable Energy

## Vision

To be the national center that contributes to the advances of research and commercialization of renewable energy technologies in the KSA and the region.

## Mission

To conduct research and development that links research, education, business and government resources for technology transfer and the development of emerging renewable energy technologies in the KSA.

## Collaborations

CoRE-RE has established research collaborations with:

1. KAUST-KSA
2. MIT, USA.
3. IIT, Delhi
4. NIMS, Japan

The center is in the process of establishing research collaborations with:

1. University of California, Berkley-USA
2. Fraunhofer-Institute of Solar Energy Systems ISE- Germany
3. Tokyo University-Japan
4. Institute of Thermodynamics and Thermal Engineering, Germany

## Research Programs

Currently there are two research programs

1. Solar Energy Research Program (SERP)  
The research thrusts under the SERP are:
  - 1.1 Solar Cell
  - 1.2 Photovoltaic Module/System Reliability and Performance
  - 1.3 Solar Cooling/Heating
2. Fuel Cell Research Program

# Solar Energy Research Program

## 1. Solar Cell

One of the major challenges facing the development of Photovoltaic technology is the design of more efficient and cost effective solar cell. The Solar Cell Research Thrust focuses its efforts on improving the efficiency of solar cells.

### Objectives

- Establish a state-of-the-art solar cells research laboratory equipped with the necessary tools to synthesize and characterize crystalline and thin film silicon solar cells
- Develop strong collaborations with international leading research groups and local industry.



## 2. Photovoltaic Module/System Performance and Reliability

PV module testing requires a complex and wide-ranging series of testing such as safety, power rating and dust accumulation. Dust is one of the major problems that need to be addressed.

### Objectives

- Measuring the performance of different PV module technologies under the different environmental conditions of the KSA.

- Understanding of the adhesion mechanisms of the fine dust particles (as found in Saudi environments) to module surfaces. This would include characterizing particle-surface interactions.
- Understanding fundamentals of the influence of moisture on dust accumulation.
- Investigating different surface technologies that can significantly reduce dust accumulation via both wet and dry approaches.
- Analyzing the performance of a 10 kW Hybrid Wind -PV system connected to the grid.
- Modeling of the Hybrid system.

## 3. Solar Cooling/Heating

As the cost of electricity keep rising and the issue of green house effect becomes of more concern, solar-powered cooling and heating systems shall compete with the conventionally powered refrigeration and air-conditioning systems.

### Objectives

- Develop solar power cooling and heating systems
- Design, manufacturing, test and evaluate the performance of such systems

# Fuel Cell Research Program

Fuel cells are the most efficient energy converter as compare to any other existing systems. They are the means of storage energy. CO2 reduction to hydrocarbons reduces green house gas and is used in industrial systems.

### Objectives

- To establish a laboratory in the kingdom that concentrates and develops the technology in the fuel cell research and electrochemical conversion of carbon dioxide to hydrocarbons.
- To develop new type of catalysts for electro-oxidation of methanol for direct methanol fuel cell (DMFC).
- To develop the electrocatalysts for electrochemical reduction of CO2.