Renewable Clean Energy (Ramot)

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Multi-Disciplinary SuperCenter for Renewable Energy
School of Mechanical Engineering

The Supercenter powerhouse is a hatchery for new clean technologies, aimed to develop technologies for higher yield, more cost-efficient production of energy from renewable sources, for a famine of energy rather than food. The focus is on solar and wind energy and bio-mass for bio-fuels.

Renewable Clean Energy Sources
Focus on clean technologies for production of energy from renewable sources, mainly solar and wind energy and bio-mass for bio-fuels. Services on the following topics: • Solar energy: High-voltage PV and thermal cells, Concentrator optics; • MEMS energy converters; • Thermal energy storage; • Combined Heat and Power (CHP); • Biofuel production with solar energy; • Water disinfection, desalination with solar energy; Cogeneration of power and biofuels

Main Research topics:

- Solar energy: High-voltage PV and thermal cells
  - Development of high-voltage cells that can reach higher efficiency and can operate at higher sunlight concentration compared to conventional cells
- Concentrator optics
- MEMS energy converters
- Thermal energy storage
- Combined Heat and Power (CHP)
- Biofuel production with solar energy
- Water disinfection, desalination with solar energy
- Cogeneration of power and biofuels

We develop and approach for conversion of organic materials (waste, biomass) into a biofuel, with simultaneous production of electrical power in addition to the fuel. The conversion is performed at moderate temperatures (400-600°C) using a Super-Critical Water Gasification reaction. Heat input can be provided from a solar concentrator field such as trough or tower. Initial results show that the overall conversion efficiency can exceed known thermal conversion processes.

Urban Photovoltaics: Polygeneration with Solar energy (UPP-Sol)
We develop Concentrating Photovoltaics (CPV) systems for urban distributed cogeneration applications, where the heat produced in the PV cells is collected and used as an additional energy product. The heat can be produce air conditioning using an absorption chiller. The overall value of the enerergy to the end user in this cogeneration mode can be approximately double that of a PV system producing only electricity.

Other research projects

- The lower limit of calorimetric heat measurement
- Heat engines and power generation cycles
- Measurement of concentrated solar radiation
- Heat transfer in CPV receivers
- Solar water disinfection (Collaboration: Hadas Mamane, TAU)

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