

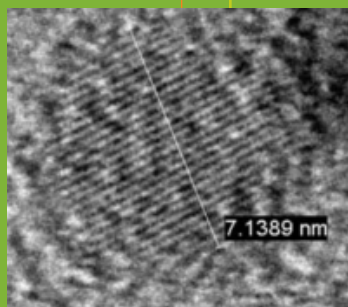
Synthesis and Characterization of Advanced Nanostructured Materials for Future Generation of Renewable Energy Applications

With an increasing global energy consumption and concerns over fossil fuel depletion, energy security, and global warming, meeting world energy demand is one of the grand challenges of the 21st century.

Estimates based on historical trends give several decades before many renewable technologies become competitive. Therefore, transformative technological innovation is the key to accelerating this timeline. Fundamental advances in materials

science will spearhead this process. The Renewable Energy Materials Research Science and Engineering Center (REMRSEC) is a key national and international resource for a broad spectrum of renewable energy research and education.

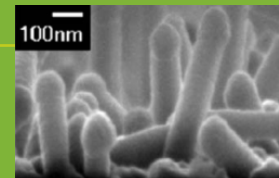
HIGHLIGHTS . . .



Silicon nanoparticles are promising new materials for photovoltaic applications by combining the tenability of materials properties on the nanoscale with silicon's established performance in photovoltaics.



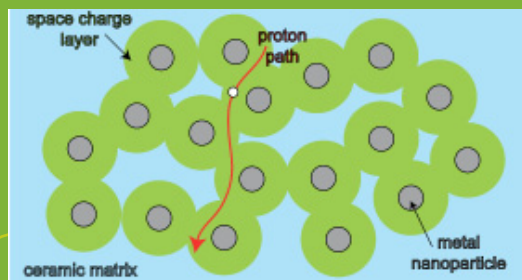
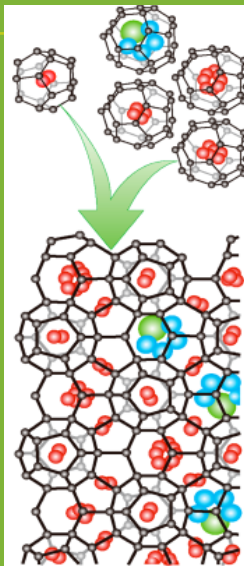
For the first time, REMRSEC scientists have modeled the formation (nucleation) and growth of a special form of ice (clathrate structure) that is very effective in storing hydrogen as a fuel.



Silicon nanowires are potentially transformative photovoltaic materials. REMRSEC scientists have grown silicon nanowires from benign tin seeds at much lower temperatures using plasma enhanced chemical vapor deposition (PECVD).

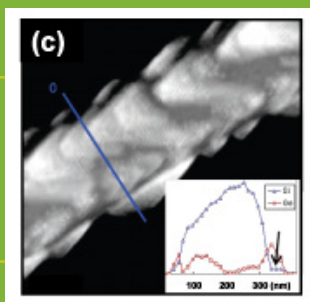
RESEARCH FUNDAMENTALS . . .

Nanostructured materials for future generations of photovoltaic devices



Nanostructured hybrid membranes for future generations of fuel cells, electrolyzers, and batteries.

Novel materials for storage of fuels.



The ability of the REMRSEC to design and tailor nanostructured materials that improve the performance of energy conversion and storage devices will help to solve what is perhaps the most important problem of the 21st century, namely the sustainable production of clean energy. //

P. Craig Taylor, Director
REMRSEC



REMRSEC SUPPORTS A VARIETY OF EDUCATION AND OUTREACH PROGRAMS...

- **REU - Research Experiences for Undergraduates:** The REMRSEC and the outreach division at the National Renewable Energy Laboratory hold a ten-week summer course featuring research on materials for renewable energy.
- **Energy Minor Degree:** The REMRSEC has established an undergraduate Energy Minor at the Colorado School of Mines.
- **K-12 Teacher Workshop:** The REMRSEC runs a summer workshop for K-12 teachers (40 teachers) on materials for use in renewable energy applications.
- **Shared Facilities:** The REMRSEC runs unique facilities for materials processing and characterization that are available to other institutions (member of MRSEC-MFN).
- **Salish-Kootenai College partnership:** The REMRSEC partners with the only Native American college with an ABET accredited engineering program.
- **Fisk University partnership:** The REMRSEC partners with Fisk University, whose students have more Ph.D. degrees than from any other traditionally African-American university.

More information about the workshops, internships, partnerships, and educational opportunities are available at:
<http://remrsec.mines.edu/educationoutreach.htm>

