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DEPARTMENT OF CHEMISTRY

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As the flagship liberal arts institution of South Dakota, The University of South Dakota, founded in 1862, has long been regarded as a leader in the state and the region. Learn more about the university at

[www.usd.edu](http://www.usd.edu).

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For assistance, call Disability Services at The U at:

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## NANOSTRUCTURED SOLAR CELLS: MATERIALS, PROCESSES AND DEVICES



**IGERT**  
(Integrative Graduate Education  
and Research Traineeship)  
**PROGRAM**



The University of South Dakota

DEPARTMENT OF CHEMISTRY

## PROGRAM DESCRIPTION

The IGERT Program is a new multi-institutional model for interdisciplinary, integrative graduate education and training. The unifying theme is *Nanostructured Solar Cells: Materials, Processes, and Devices*. The proposed program is a collaborative effort from Ph.D. programs in Materials Chemistry at The University of South Dakota (USD), Electrical Engineering at South Dakota State University (SDSU), Nanoscience and Nanoengineering and Materials Engineering and Science at the South Dakota School of Mines and Technology (SDSM&T).

Key elements of the IGERT program include: interdisciplinary, cross-campus research rotations for graduate students; advanced thematic coursework; a student-guided seminar series and symposium; internships at the National Renewable Energy Laboratory (NREL); internships in the solar-energy private sector; educational outreach to K–16 students, with particular emphasis on Native American students; and competitive stipends (\$30,000) and an additional \$10,500 for cost of education allowance (tuition, fees, health insurance and travel). IGERT students will pursue research with a major advisor on their home campus and a collaborating advisor on a second campus in an alternate discipline. The program will train professionals with broad interdisciplinary backgrounds, uncompromised depth of knowledge in their chosen fields, and provide experience working on large-scale research projects in a collaborative and interdisciplinary environment.

The IGERT program provides students in otherwise modest-sized graduate programs with an opportunity to make significant contributions to high-impact research as a member of a large, statewide team of scientists and engineers. Its vision is to leverage the combined research infrastructure of South Dakota in the physical sciences and engineering to create a program in research and graduate education that takes full advantage of complementary areas of expertise across the state within the unifying interdisciplinary theme of *Nanostructured Solar Cells*.

## RESEARCH PROJECTS

A multi-institutional interdisciplinary research cluster of faculty and students pursues each research project with a unique vision for capitalizing on new developments in nanotechnology to create the next generation of more efficient, more cost-effective, or more flexible solar energy technology. The Research Projects are based on the following topics:

- Luminescent Solar Concentrators (LSC) based on Metal-Surface Enhancement
- Cost Effective Excitonic Solar Cells
- Nanostructured Materials and Devices for Inorganic and Excitonic Solar Cells
- Photoelectrochemical Cells (PECs)

## ADMISSION REQUIREMENTS

- Baccalaureate degree in chemistry equivalent to that of ACS approved major with a GPA of 3.0 or higher
- Application form, found at <http://www.usd.edu/graduate-school/how-to-apply.cfm>
- Application fee of \$35
- Official transcripts from all institutions attended
- Three letters of recommendation
- Statement of Purpose
- GRE and TOEFL scores are required for international students only

### *Please Note*

- IGERT trainees must be U.S. citizens or permanent residents
- International students may also participate in the program as IGERT affiliates

The curriculum for each of the Ph.D. programs includes three electives which can be chosen from outside the primary program or discipline. The courses in the table below are offered at least biennially and are appropriate for students with an undergraduate degree in one of the relevant disciplines coupled with the common background discussed above. IGERT students will be asked to choose advanced courses which best relate to their interdisciplinary dissertation project. At least two of those must come from an alternate discipline.

Currently Available Advanced Interdisciplinary Ph.D. courses			
Materials Chemistry	Electrical Engineering	Materials Engineering and Science	Nanoscience and Nanoengineering
<ul style="list-style-type: none"> <li>• Synthesis &amp; Characterization of Nano-structured Materials</li> <li>• Applications of Nano-structured Materials</li> <li>• Solid State Chemistry or Solid State Physics</li> <li>• Luminescent Materials</li> <li>• Electro-chemistry</li> <li>• Polymer Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• Photovoltaics</li> <li>• Advanced Electronic Materials</li> <li>• Electric Properties of Materials</li> <li>• Organic Photovoltaics</li> <li>• Advanced Photovoltaics</li> </ul>	<ul style="list-style-type: none"> <li>• Interfacial Phenomena</li> <li>• Oxidation &amp; Corrosion of Metals</li> <li>• Polymer Chemistry</li> <li>• Fundamentals of Materials Engineering</li> <li>• Condensed Matter Physics</li> <li>• Chemistry of Materials</li> </ul>	<ul style="list-style-type: none"> <li>• Nanomaterials for Photovoltaics</li> <li>• Nanophotonics</li> <li>• Nanophotonic Materials</li> <li>• Nanomaterials</li> <li>• Theory and Application of Nanomaterials</li> <li>• Characterization of Nanomaterials</li> </ul>