



Colorado School of Mines  
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Web site: <http://www.mines.edu/Research/>

## ***Center for Solar and Electronic Materials (CSEM)***

The Center for Solar and Electronic Materials (CSEM) was established in 1995 to focus, support, and extend growing activity in the area of electronic materials for solar and related applications. CSEM facilitates interdisciplinary collaborations across the CSM campus; fosters interactions with national laboratories, industries, public utilities, and other universities; and serves to guide and strengthen the electronic materials curriculum.

CSEM draws from expertise in the departments of Physics, Metallurgical and Materials Engineering, Chemical Engineering, Chemistry and Geochemistry, Division of Engineering, and Petroleum Engineering. The largest research activity is directed at the photovoltaic industry. CSEM also supports research in thin film materials, polymeric devices, electrophotography, encapsulants, electronic materials processing, and systems issues associated with electronic materials and devices.

Graduate students in materials science and the above mentioned departments can pursue research on center-related projects. Undergraduates are involved through engineering design courses and summer research. Close proximity to the National Renewable Energy Lab and several local photovoltaic companies provides a unique opportunity for students to work with industry and government labs as they attempt to solve real world problems. External contacts also provide guidance in targeting the educational curriculum toward the needs of the electronic materials industry.

### ***Background:***

- Formally established in 1995
- University-sponsored
- Involves faculty and students from the Departments of Physics, Metallurgical and Materials Engineering, Chemical and Petroleum Engineering, Chemistry and Geochemistry, and the Division of Engineering

### ***Areas of Expertise:***

- Photovoltaics
- Semiconductors
- Chemical Vapor Deposition
- Polymer Science
- Encapsulants
- Mechanical and Electronic Systems Design
- Surface Science
- Structural Characterization
- Thin Film Materials
- Electronic Materials Processing
- Nanoscience

### ***Sponsoring Organizations:***

- National Renewable Energy Laboratory
- Colorado Advanced Materials Institute
- ITN Energy Systems
- Motorola
- Advanced Technology Materials
- Materials Research Group
- Green Development
- Texas Instruments
- National Science Foundation
- Office of Naval Research
- First Solar
- Colorado Photonics and Optoelectronics Program (CPOP)

### ***Method of Technology Transfer:***

- Project reviews and reports
- Publication of scientific results
- Technical presentations
- M.S. and Ph.D. graduates from program
- Annual meeting of the external advisory committee
- **Web site:** <http://www.mines.edu/research/csem>

### ***Spin-offs / Contributions:***

- State-of-the art thin film CdTe solar cell technology
- Electronic materials focus area of the Materials Science graduate program
- New five-year combined undergraduate/Masters degree directed at the electronic materials and processing industries

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