

# GRADUATE PROGRAM AT UC MERCED

## MACES (Merced nAnomaterials Center for Energy and Sensing)

Solutions to many of today's critical scientific and technological challenges, from converting and storing green energy at record high efficiencies to designing portable instruments for medical diagnosis, require multidisciplinary approaches. To achieve these goals, MACES was established at UC Merced in 2015 with substantial support from the National Aeronautics and Space Administration (NASA). MACES graduate students undergo cutting-edge training in one or more of the following core areas: Materials Science and Bioengineering, Mechanical engineering, Physics, and Chemistry. In parallel, by participating in multidisciplinary and vertically integrated research projects, students acquire scientific knowledge in a multitude of areas including materials synthesis and characterization and device fabrication and evaluation. By working with the diverse MACES faculty as well as NASA mentors, our students master research skills, critical and analytical-thinking capabilities, self-learning, and communication, positioning them to pursue a variety of STEM careers.

### INTEGRATED CROSS-DISCIPLINARY GRADUATE TRAINING FOR FUTURE TECHNOLOGY WORKFORCE

The MACES graduate training program is designed to support highly motivated graduate students who are interested in seeking challenges that go beyond a single traditional academic discipline and combine cutting-edge fundamental materials research in Physics, Chemistry, and Engineering with high impact technologies. Benefits of the training program include:

**MULTIDISCIPLINARY COURSEWORK:** MACES students participate in the nanotechnology emphasis tracks within Physics, Chemistry, Mechanical Engineering, and Biological Engineering & Small-scale Technologies (BEST) graduate groups. Our curriculum provides in-depth training in the home discipline as well as sustained exposure to relevant fields, facilitating the cross-fertilization of ideas and collaborations.

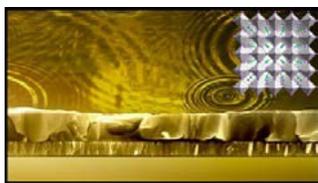
**MENTORING:** MACES students benefit from comprehensive mentoring by faculty who are top experts in their fields. Our peer mentoring program pairs new students with senior students who help them navigate the challenges of graduate school. MACES hosts student workshops for developing professional skills and specific research skills.

**OUTREACH:** MACES students are involved in outreach activities that enhance public interest in science and understanding of topics in STEM. These activities also help our students hone their communication skills.

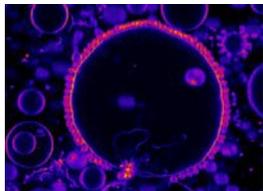
**MULTIDISCIPLINARY RESEARCH TRAINING:** MACES students address important challenges in nanomaterials for NASA missions, which require innovative and multidisciplinary solutions. MACES students interact and collaborate with other scientists and engineers who share a common interest in functional nanomaterials and have complementary expertise. All MACES fellows participate in one of the MACES Research Thrusts (Energy or Sensing), which meet monthly to promote collaboration.

**NASA INTERNSHIPS:** MACES have established partnerships with several NASA Research Centers, including Ames, Langley, Glenn, and the Jet Propulsion Laboratory. Graduate students (with U.S. citizenship) have the opportunity to work with NASA mentors to learn important scientific skills and apply their training and their talent to tackle technological challenges in aeronautics and space missions. This is an important stepping stone for pursuing future careers at NASA.

**STATE-OF-THE-ART FACILITIES:** MACES students have access to cutting-edge equipment and facilities at UC Merced and nearby National Labs.



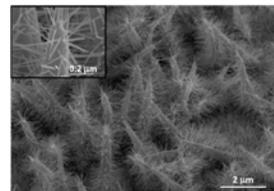
High throughput printing of efficient perovskite photovoltaics



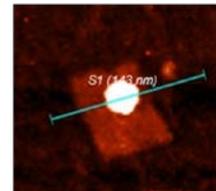
Satellite vesicles budding from synthetic giant lipid vesicles



8 nm polymer fibers exhibiting thermal contraction



Branched nanostructures



Quantum dot on DNA assembly

### How To Apply

Applicants are encouraged to directly contact the MACES faculty member whose research is of most interest to them. Students interested in training with MACES should apply for graduate programs at UC Merced indicated below. Specific requirements for application can be found in the graduate school admission website. All applicants are required to complete the General Test of the Graduate Record Examination (GRE) and have a GPA > 3.0. Students specifically interested in Materials Science and Bioengineering should apply for the Biological Engineering and Small-scale Technologies (BEST) graduate group. Students who are interested in Chemistry, Mechanical Engineering or Physics should apply for admission to Chemistry, Mechanical Engineering or Physics graduate group respectively.



Merced nAnomaterials Center for Energy and Sensing (MACES) is the first externally funded research center at UC Merced which is the University of California's newest campus. MACES builds upon existing nanomaterial-based research programs developed by each participating investigator. MACES serves as a nexus for UC Merced nanomaterials-based research and education. It provides researchers at all levels access to expertise and equipment for cutting-edge nanomaterial-based research in a collaborative and multidisciplinary environment.

**Jennifer Lu, MACES Center Director | Materials Science and Engineering**

Email: [Jennifer.lu@ucmerced.edu](mailto:Jennifer.lu@ucmerced.edu)

Research Interests: Design, synthesis and characterization of new energy conversion and storage platforms.

**Tao Ye | Chemistry**

Email: [tye2@ucmerced.edu](mailto:tye2@ucmerced.edu)

Research Interests: Measure and control of single biomolecules, biologically inspired nanostructures at interfaces.

**Sayantani Ghosh | Physics**

Email: [sghosh@ucmerced.edu](mailto:sghosh@ucmerced.edu)

Research Interests: Photonics, nanoplasmonic materials and hybrid photovoltaics.

**Vincent Tung | Materials Science and Engineering**

Email: [ctung@ucmerced.edu](mailto:ctung@ucmerced.edu)

Research Interests: Synthesis and assembly of 3D monoliths for solar energy conversion.

**Min Hwan Lee | Mechanical Engineering**

Email: [mlee49@ucmerced.edu](mailto:mlee49@ucmerced.edu)

Research Interests: Solid state fuel cells and electrocatalysis.

**Ashlie Martini | Mechanical Engineering**

Email: [amartini@ucmerced.edu](mailto:amartini@ucmerced.edu)

Research Interests: Tribology for energy saving.

**Boaz Ilan | Applied Math**

Email: [bilan@ucmerced.edu](mailto:bilan@ucmerced.edu)

Research Interests: Mathematical modeling of solar energy devices.

**Michael Scheibner | Physics**

Email: [mscheibner@ucmerced.edu](mailto:mscheibner@ucmerced.edu)

Research Interests: Quantum-enhanced materials and technology, nano- and quantum- optics for sensing.

**Ryan Baxter | Chemistry**

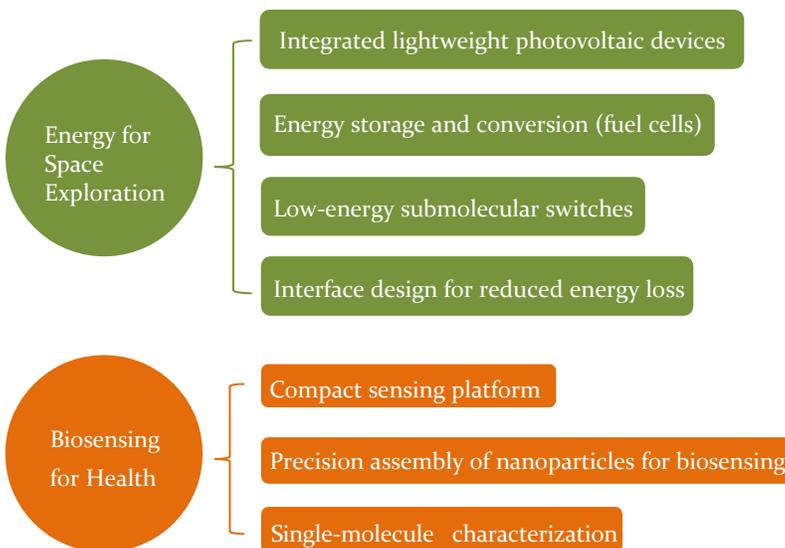
Email: [rbaxter@ucmerced.edu](mailto:rbaxter@ucmerced.edu)

Research Interests: Kinetic study of radical reactions to produce useful materials from simple precursors for green energy.

**David Strubbe | Physics**

Email: [dstrubbe@ucmerced.edu](mailto:dstrubbe@ucmerced.edu)

Research Interests: New computational methods to study electronic and optical properties of photovoltaic materials.



## Qualifications

We are looking for proactive and self-motivated students to join MACES working on the cutting-edge research projects: functional nanomaterial enabled energy and sensing. Students with bachelor or master degrees in Chemistry, Materials Science and Bioengineering, Physics, Chemical Engineering, Mechanical Engineering, or relevant fields are preferred.

## Funding Opportunities

Students receive year-round financial support including a stipend of \$24,000 - \$26,000 per year and payment of fees and tuition. Students are typically supported by teaching and research assistantships, which can be supplemented by fellowships, awards, and other forms of financial assistance.

