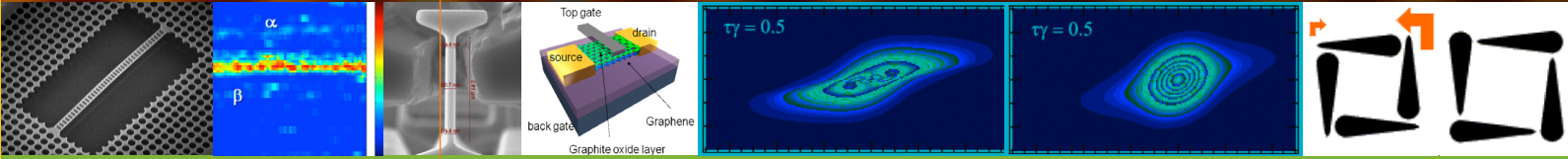


Caltech

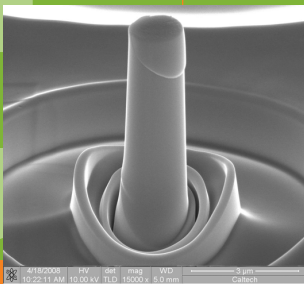
Harnessing Physics, Chemistry and Biology to Create Revolutionary Materials-Based Technologies



California Institute of Technology

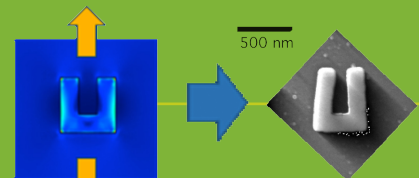
The Center for Science and Engineering of Materials (CSEM) at Caltech is a multifaceted research and education center that combines world-class materials research programs with educational programs serving communities both within and external to Caltech. The research activities are organized into three IRGs: I Active Nanophotonic Materials exploits the coupling between photonic, phononic and electronic responses of materials to manipulate light and sound waves with exquisite precision; II Patterns, Gradients and Signals in Soft Biomaterials focuses on the preparation of novel soft, bioactive materials whose physical features (e.g., compliance) and biochemical composition (e.g., the identity and density of adhesion ligands) may be varied independently, systematically

and in spatially graded fashion to elicit predictable biological behavior; and III Advanced Structural Materials with Nanoscale Architecture – Glasses, Composites, and Cellular Foams explores new structural forms of metallic glasses to design revolutionary structural engineering materials. The center also supports a vigorous Nanotechnology Research Initiative in the area of Graphene Atomic Switches for Ultracompact Logic Devices and Non-Volatile Memory Elements which aims to fundamentally advance beyond-CMOS computing technologies through a combination of high quality graphene synthesis and stochastic approaches to computing. Through inclusive research and education activities, CSEM promotes diversity among center participants at all levels.



HIGHLIGHTS . . .

A unique combination of high yield strength and high ductility is achieved in metallic glass nanopillars.

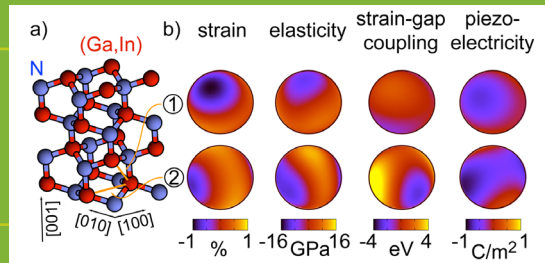


Mechanically compliant meta-materials on deformable substrates display tunable optical and phononic properties.

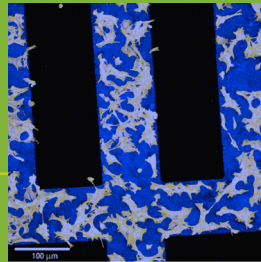
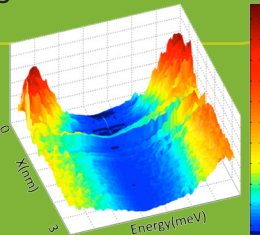
DIRECTOR: Sossina M. Haile
<http://www.csem.caltech.edu/>

RESEARCH FUNDAMENTALS . . .

Predicting structure-property relationships ab initio – the ultimate goal.



Advancing beyond-CMOS electronics through fabrication of high-quality, large-area graphene: observations of strain-induced giant pseudo-magnetic fields and charging effects.



Designing materials that elicit predictable biological behavior by independent, spatial control of physical properties and biochemical composition.

Our center takes on the most challenging materials problem — the atomic-level construction of materials displaying unique and targeted properties. The applications are boundless, from artificial biopolymers for tissue reconstruction to stochastic electronics for high-power computing. //

Sossina M. Haile, Director
CSEM



CSEM OFFERS BROAD EDUCATION AND RESEARCH OPPORTUNITIES THROUGH INCLUSIVE OUTREACH PROGRAMS AND STRONG PARTNERSHIPS

- The CSEM-REU program offers Caltech and non-Caltech undergraduates summer research opportunities in CSEM laboratories.
- The Materials Partnership with CalState LA promotes scientific collaborations between Caltech and CalState faculty and places CalState undergraduates in CSEM laboratories for summer research.
- A collaboration with the Institute for Educational Advancement brings talented highschool students to CSEM laboratories for a summer research apprenticeship.
- The High School Science Open House brings local high school students to the Caltech campus to learn about the excitement of science and demystify the college application process.

OUTREACH

More information about the workshops, internships, partnerships, and educational opportunities are available at:
<http://www.csem.caltech.edu/outreach.html>

