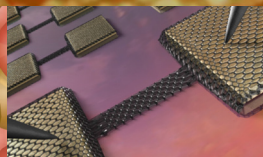
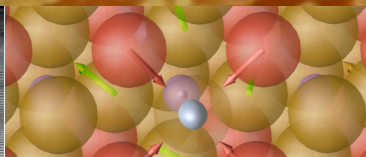
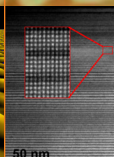
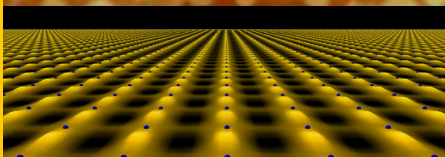


CCMR

Exploring and Advancing the Design, Control and Fundamental Understanding of Materials Through Collaborative Experimental and Theoretical Studies



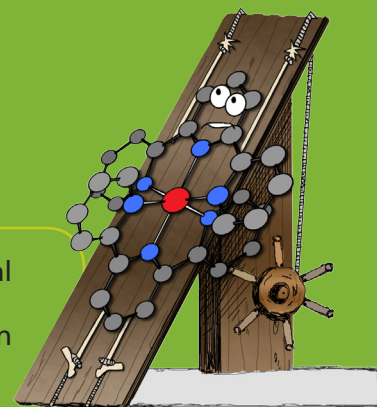
The central mission of the Cornell Center for Materials Research (CCMR) is to explore and advance the design, control, and fundamental understanding of materials through collaborative experimental and theoretical studies.

The **Controlling Electrons at Interfaces** group seeks atomic-level understanding and control of the electronic properties of interfaces, so as to better manipulate electron and spin transport. The **Dynamics of Growth of Complex Materials** group works to understand and control the dynamics of growth of complex materials and, in particular, the formation and control of the crucial interfacial layers, while fostering cross-fertilization between the organic electronic and oxide communities. The **Atomic Membranes as Molecular Interfaces** group explores the properties of atomic membranes: mechanically robust, freestanding films of material as thin as a single atom. The **Controlling Complex**

Electronic Materials group starts with materials that can be reasonably well described by current theory and then systematically perturbs the targeted materials through experimentally-accessible changes in electron overlap or carrier density, using observed changes to drive advances in electronic structure theory. Three other activities complete the CCMR's mission: educational outreach to K-12 teachers, students, and undergraduates; industrial outreach and knowledge transfer; and the operation of Shared Facilities to support research on- and off-campus.

HIGHLIGHTS . . .

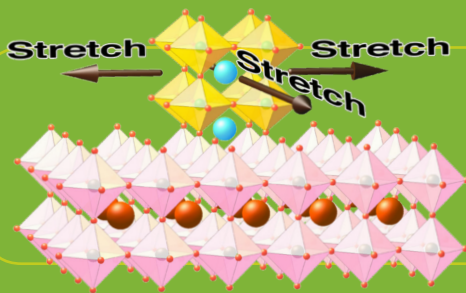
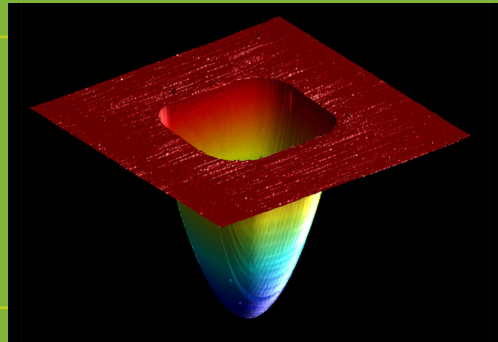
Demonstrated *in-situ* mechanical control of molecular spin states by stretching molecules between mechanically-adjustable electrodes.



DIRECTOR: Melissa A. Hines
www.ccmr.cornell.edu

MORE HIGHLIGHTS . . .

Produced the world's thinnest balloon: a one-atom-thick membrane that is impermeable to gas but capable of withstanding large pressure differentials.



Transformed a "boring" ceramic into a rare but very useful type of material — a multiferroic — by slightly changing the spacing between its atoms.

The CCMR explores fundamental challenges in interdisciplinary materials research that will enable technological progress and that have a scope and complexity that require the sustained contribution of researchers from multiple disciplines. //

Melissa A. Hines, Director
CCMR



THE CCMR OFFERS DIVERSE EDUCATION AND PARTNERSHIPS...

- The CCMR operates a web-based lending library of inquiry-based experiments that can be borrowed by any educator in the nation, free of charge.
- The CCMR offers a week-long summer course for high-school chemistry teachers, which includes a number of inquiry-driven experiments.
- The JumpStart program partners small businesses in New York State with Cornell faculty and students to solve well-defined technical problems and to bring new products to market.
- The CCMR Shared Facilities are an important regional and national resource, attracting more than 700 users per year — including more than 100 external users from both academia and industry.

OUTREACH

More information about the workshops, internships, partnerships, and educational opportunities are available at www.ccmr.cornell.edu

