# Carbon Cycle 2.0

## Pioneering science for sustainable energy solutions

### Carbon Cycle 2.0 LDRD Seminar Series

The Carbon Cycle 2.0 initiative is hosting a weekly seminar series given by recipients of Laboratory Directed Research and Development (LDRD) awards related to climate and energy. The seminars will take place most Thursdays at 2 pm in the new User Support Building large conference room (15-253) and are open to anyone interested in learning more about the wide variety of Carbon Cycle 2.0-themed research at Berkeley Lab.

## Graphene-based Nanostructured Composite Materials for High Energy Batteries

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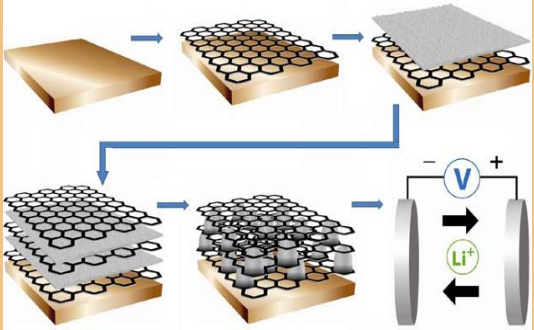
WHEN: FRIDAY JUNE 24, 2PM - 3PM
WHERE: BUILDING 15 ROOM 253




Assembly of graphene/Sn-nanopillar multilayered nanostructure and its potential application as high performance binder-free anode in rechargeable lithium-ion batteries.

High energy density, low cost, and safe electrochemical energy storage devices are critical for enabling the use of renewable energy and the reduction of green house gas emission. The use of novel high capacity electrode materials in lithium batteries, however, faces great challenges due to the large volume change accompanying the insertion and retraction of lithium ions in/from such materials which leads to severe degradation of the electrodes upon cycling and dramatically shorten the cycle life of the cells.

Using nanostructured composite materials could be a promising approach to solve this problem, though such structures should be carefully designed so that it will not cause new problems, such as the stability of solid-electrolyte-interphase layers. In our research, we use graphene and its derivatives as platform materials to synthesize nanostructured composites with various high-capacity anode (Si, Sn, Fe3O4) and cathode (Sulfur, Li2S) materials. The atomic thin graphene provides desirable properties as a matrix material for battery electrodes, such as light weight, high surface area, high mechanical strength, and high electrical conductivity. Improved lithium storage capacity, cycling life, and rate capability have been observed in lithium cells made from these nanocomposite electrodes.