Graphene nanoribbons boost battery capacity

Researchers at Rice University, Houston, boosted the efficiency of lithium-ion (LI) batteries using ribbons of graphene that start as carbon nanotubes. Proof-of-concept anodes built with graphene nanoribbons (GNRs) and tin oxide show an initial capacity better than the theoretical capacity of tin oxide alone, according to chemist James Tour. After 50 charge-discharge cycles, test units retain a capacity more than double that of the graphite currently used for lithium-ion battery anodes.

In experiments, graphene nanoribbons and tin oxide particles about 10 nm wide were mixed in a slurry with a cellulose gum binder and a bit of water and then spread on a current collector and encased in a button-style battery. Tests show initial charge capacities of more than 1520 mAh/g. Over repeated charge-discharge cycles, the material settled into a solid 825 mAh/g. For more information: James Tour, 713/348-6246, tour@rice.edu, http://chemistry.rice.edu.

Atomic scale LEGOs

Researchers from the University of Manchester, UK, show how layered materials can be split into isolated atomic planes and reassembled back into an intelligently-chosen sequence to create new materials and structures that do not exist in nature. The graphene-like materials promise a range of applications, but in isolation are unlikely to offer the same remarkable properties as graphene itself. “Atomic LEGOs” were created by stacking atomically-thin materials in heterostructures and artificial materials so that the resulting properties can be controlled and manipulated. Such materials made with single-plane precision could not be constructed by existing techniques. The atomic scale LEGO was used to improve the electronic quality of graphene and make graphene transistors with high on-off ratios suitable for integrated circuits.

www.graphene.manchester.ac.uk.

Nanotechnology sharpens displays

University of Akron, Ohio, researchers developed new materials that function on a nanoscale, which could lead to the creation of lighter laptops, slimmer televisions, and crisper smartphone visual displays. Known as “giant surfactants”—or surface films and liquid solutions—researchers, led by Stephen Z.D. Cheng, dean of the College of Polymer Science and Polymer Engineering, used a technique known as nanopatterning to combine functioning molecular nanoparticles with polymers to build the novel materials. The giant surfactants are large, similar to macromolecules, yet they function like molecular surfactants on a nanoscale, Cheng says. The outcome is nanostructures that guide the size of electronic products. For more information: Stephen Z.D. Cheng, 330/972-7500, scheng@uakron.edu, www.uakron.edu/dps.