Batteries smaller than a grain of salt

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Lithium-ion batteries have become ubiquitous in today's consumer electronics -- powering our laptops, phones, and iPods. Research funded by DARPA is pushing the limits of this technology and trying to create some of the tiniest batteries on Earth, the largest of which would be no bigger than a grain of sand.

These tiny energy storage devices could one day be used to power the electronics and mechanical components of tiny micro- to nano-scale devices.

Jane Chang, an engineer at the University of California, Los Angeles, is designing one component of these batteries: the electrolyte that allows charge to flow between electrodes. She presents her results today at the AVS 57th International Symposium & Exhibition, which takes place this week at the Albuquerque Convention Center in New Mexico.

"We're trying to achieve the same power densities, the same energy densities as traditional lithium ion batteries, but we need to make the footprint much smaller," says Chang.

To reach this goal, Chang is thinking in three dimensions in collaboration with Bruce Dunn other researchers at UCLA. She's coating well-ordered micro-pillars or nano-wires -- fabricated to maximize the surface-to-volume ratio, and thus the potential energy density -- with electrolyte, the conductive material that allows current to flow in a battery.

Using atomic layer deposition -- a slow but precise process that allows layers of material only an atom thick to be sprayed on a surface -- she has successfully applied the solid electrolyte lithium aluminosilicate to these nanomaterials.

The research is still in its early stages: other components of these 3D microbatteries, such as the electrodes, have also been developed, but they have yet to be assembled and integrated to make a functioning battery.

More information: The presentation, "Engineering LixAlySizO Thin Films as a Solid Electrolyte for 3D Microbatteries" is at 2:40 p.m. on Tuesday, October 19, 2010. ABSTRACT: www.avssymposium.org/Open/Sear … erNumber=EN+EM-TuA-3

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