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The scalable silicon solution for Li-ion batteries

Reliable high-energy, rechargeable and portable energy storage systems are essential for the future of smart transportation. The energy density limitation for current state of the art LIB's is one of the issues that needs to be addressed before mass electrification of vehicles can take place. The introduction of Silicon as an anode in rechargeable LIB's can significantly increase their energy density, compared to the state-of-the-art graphite-based anodes. Silicon anodes offer the potential to substantially reduce the mass/volume to stored energy ratio, allowing the battery to be more efficient. However, Silicon anodes exhibit poor capacity retention. This poor capacity retention is attributed to continual SEI growth and volume expansions during the charge discharge process. The silicon nanoparticle material properties are strongly correlated with morphology; crystallinity, particle size, particle size distribution, purity and surface modification which all influence electrochemical behavior. The particle size and surface properties are particularly important parameters for silicon nanoparticles and must be optimized for advanced, next generation, high-performance anodes for LIBs.

Formed in 2014 as a spin-off at Tulane University, Advano is a lithium-ion battery company that is committed to accelerating the renewable energy revolution by enabling access to energy storage systems that store more energy and last longer. Advano's core team of scientists and engineers feature experts in the advanced energy storage space, and

industry professionals who are uniquely focused on the commercialization of silicon-enhanced LIBs. Advano tackles silicon's numerous issues using surface functionalization technology. Advano offers a platform to establish a process for cost-effective manufacturing of advanced surface modified silicon nanoparticles with properties that can mitigate the difficulties facing new material for future, high capacity anodes for LIBs. This heavily patented platform technology allows us to controllably alter silicon's properties at its most intimate interfacial dimension—the surface where it meets electrolyte and lithium.

Speaker Biography

Shiva Adireddy is the co-founder and chief technology officer of Advano. As chief technology officer, he continues to shape the company's technical vision and guides product development from concept through manufacturing. He holds a PhD in nanomaterials design and fabrication from the University of New Orleans and an MBA from Tulane University's Freeman School of Business. Over the course of the last 12 years, he has compiled an impressive track record in energy & materials entrepreneurship, manufacturing diverse classes of materials to solve problems in the fields of renewable energy and clean technology. His expertise in both the technical and business aspects of nanotechnology is testified to by his authorship of articles in more than 40 peer-reviewed publications and registration of numerous patents. Prior to founding Advano, he served as research assistant professor in the department of physics and materials engineering at Tulane.

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