



## Reinventing Batteries Through Nanotechnology

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### Abstract:

The fast growth of portable power sources for transportation and grid-scale stationary storage presents great opportunities for new battery chemistries. How to increase energy density, reduce cost, speed up charging, extend life, enhance safety and reuse/recycle are critical challenges. Here I will present how we utilize nanoscience to reinvent batteries and address many of challenges by understanding the materials and interfaces through new tools and providing new materials guiding principles. The topics to be discussed include: 1) A breakthrough tool of cryogenic electron microscopy, leading to atomic scale resolution of fragile battery materials and interfaces. 2) Materials design to enable high capacity materials: Si and Li metal anodes and S cathodes. 3) Interfacial design with polymer and inorganic coating to enhance cycling efficiency of battery electrodes. 4) New electrolyte design. 5) New battery chemistry for grid scale storage.

### Curriculum Vitae:



At Stanford University, Yi Cui is the director of the [Precourt Institute for Energy](#), co-director of the StorageX Initiative, Fortinet Founders Professor of materials science and engineering and of photon science at [SLAC National Accelerator Laboratory](#). He has founded five companies to commercialize technologies from his lab: Amprius, 4C Air, EEnotech, EnerVenue and LifeLabs Inc. He has published more than 500 papers and is one of the world's most cited scientists (h-index 233). He is an elected fellow of the American Association for the Advancement of Science, the Materials Research Society, the Electrochemical Society, and the Royal Society of Chemistry. He is an executive editor of *Nano Letters* and co-director of the Battery 500 Consortium. His honors include Global Energy Prize (2021), [Ernest Orlando Lawrence Award](#) (2021), Materials Research Society Medal (2020) and Blavatnik National Laureate (2017). He is elected member of the US National Academy of Sciences.

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