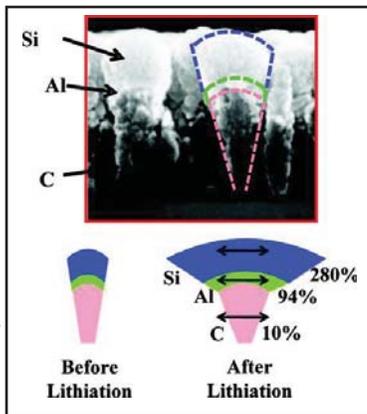


# NYSERDA Research and Development

## Helping innovative technologies in the **Energy Storage Sector** come to life.



One of the greatest opportunities to enable a sustainable energy future is energy storage. Intermittent renewable energy sources such as wind turbines and solar panels are helping businesses and homeowners produce cleaner electricity, but the challenge is to store the energy produced by these technologies so that it can be used when it is needed the most. Energy storage can also help existing fossil-fueled power plants operate at their peak efficiency point by storing excess electricity for periods of peak demand – mitigating the need to ramp production up and down as frequently. Industry is working to develop energy storage solutions for two key areas: the smart grid – an efficient, reliable electricity system, and hybrid propulsion systems for transportation.

Photo of nanoscoops showing their expansion as lithium ions penetrate the silicon.

## Public-Private Partnerships

In 2009, the New York Battery and Energy Storage Technology Consortium (NY-BEST™) was launched to help position New York as a global leader in energy storage technology for heavy-duty transportation, electric grid, and other applications. NY-BEST represents a key public/private partnership to promote broad, statewide implementation of a safe, secure and reliable smart grid. NY-BEST members are also developing energy storage technologies to make better batteries and fuel cell systems for transportation applications from automobiles to mass transit.

New York State utilities, universities, industry and government leaders are also collaborating as part of the New York State Smart Grid Consortium. The consortium promotes technologies that improve smart grid system reliability, security, and efficiency, while encouraging clean energy power and conservation. Improving electric system efficiency reduces environmental impact and helps avoid price increases associated with an aging infrastructure.

NYSERDA is supporting the efforts of NY-BEST and the Smart Grid Consortium, and working with leading manufacturers, systems integrators, researchers and policy makers to build upon New York's significant hydro-electric storage with advanced energy storage solutions to develop the future of sustainable grids, efficient electrified rail, and clean transportation.

# Featured Examples

## Proven Success



Started with seed funding from NYSERDA, NY-BEST brings industry innovators together, allowing them to drive the direction of investment and to cooperate on commercializing **state-of-the-art solutions for energy storage challenges**. This vibrant, collaborative community includes more than 100 members representing Fortune 100 companies, start-ups and major research institutions working on development, prototyping, testing and production of new energy storage technologies for smart grid and transportation applications. One NY-BEST member, GE, is manufacturing advanced batteries for stationary and transportation applications, resulting in a new factory in Schenectady, NY, and more than 300 jobs. **This industry-led coalition is building and promoting a vibrant, world-class, advanced battery and energy storage sector in New York State.**

## Spinning Off to Power Up

Photo courtesy of Ioxus, Inc.



Ioxus, Inc., with assistance from NYSERDA, was created as a spin-off of 40-year-old Custom Electronics, Inc. in Oneonta, NY. Ioxus manufactures environmentally friendly, high-density ultra-capacitors. Ultra-capacitors store high-energy density allowing for **fast recharge, thousands of charge/discharge cycles** and **quick bursts of power**, making them ideal energy storage solutions for automatically adjusting wind turbine blades to meet oncoming wind direction, hybrid buses and cars, and consumer electronics.

Recognized for its technological savvy, Ioxus was named to the 2011 Global Cleantech 100, which highlights clean technology companies from around the world that are most likely to make significant market impact over the next five to ten years. Ioxus has **raised \$21 million in investments and grown to 50+ employees.**

## Riding the Regenerative Rails

Photo courtesy of Electrical Power worX Corp



Testing is underway to use capacitors as energy storage devices on subway cars. The capacitors will absorb regenerative braking energy and then release energy to supplement acceleration.

Electrical Power worX (EPX) in Alfred, NY, was founded in 2006 by a group of engineers experienced in large power conversion technology, mechanical design, and electric propulsion systems for vehicle applications. With help from NYSERDA, EPX is developing and testing a 2 MW ultra-capacitor wayside energy storage system including ultracapacitors from Ioxus in Oneonta, NY, for use on the Long Island Railroad. This system could be used for storing electricity during off-peak periods to help power trains during periods of high-demand during rush hour and to store for railcar regenerative braking energy. This new energy storage system will **alleviate the need for a new multi-million dollar electrical substation** and **stabilize electric energy** available to the trains on this section of rail on Long Island ensuring **consistent and timely travel for commuters**. It is also an excellent example of exploring a solution to a real congestion issue in the New York City-metro area with technologies developed by Upstate New York partners.

## Learn more at [nyserderda.ny.gov](http://nyserderda.ny.gov)

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels. NYSERDA professionals work to protect our environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York since 1975.