

RAIBA & STOBA®

At CES 2018, ITRI is exhibiting innovative solutions that enhance the efficacy and safety of batteries. One is a new generation intelligent battery system, [RAIBA](#) (Reconfigurable Array of Inexpensive Batteries Architecture); the other is its proprietary high-safety battery material, [STOBA](#)® (Self-Terminated Oligomer with hyper-Branched Architecture).

[RAIBA \(Reconfigurable Array of Inexpensive Batteries Architecture\)](#)

Technology Breakthroughs and Features:

- A software-intensive energy storage system which reconfigures a battery array online in real time to better suit specific load requirements.
- Reduces system-level decay by 51 percent and extends system runtime by 90 percent for a set of heterogeneous 20-battery modules with capacity ranging from 1.5-4Ah.
- Adds fail-safe and fail-operational functionalities to a battery system.
- Capable of using a mix of old and new battery modules in a green power storage system, thus contributing to environmental protection and achieving a sharing and circular economy.
- Reduces initial construction cost and total cost of ownership of large-scale electrical energy storage.



Technological Components and Specifications:

- Online constant-current switch modules with 96V/50A rating for each module.
- Battery array real time reconfiguration algorithm system software.
- Self-learning and optimization technology.
- Modular RAIBA battery system with 10KW/10KWh per unit.

Potential Applications:

- Battery pack management and fail-operational in electric vehicles.
- Electrical energy storage systems connected to power grids.

STOBA® (Self-Terminated Oligomer with hyper-Branched Architecture)



Technology Breakthroughs and Features:

- A solution that fundamentally resolves the safety issue of lithium batteries.
- A multi-protective mechanism that prevents current shorting, thermal runaway, and explosion of lithium batteries.
- Works effectively to ensure battery safety at high temperature and when severe impact or penetration occurs.
- Acts as a physical barrier insulating the anode and cathode, decreasing both electric and ionic conductivity and suppressing thermal runaway.
- The suppression function enhances the fail-operational capability of a battery system.
- Can improve product performance at higher operating temperatures.
- Can extend the high temperature recycle life by over 20 percent.
- Has passed battery nail penetration tests.
- Has low cost to mass produce.
- A 2009 R&D 100 Award winner.

Technological Components and Specifications:

- Hyper-branched polymer added to lithium batteries to form a protective film.
- Acts as tiny nano-fuses inside Li-ion cell, inhibiting thermal runaway and reducing fire hazard.
- When the battery heats over 150°C due to external force, the end points of the STOBA® polymer's branched structure react together to form a cross-linking three-dimensional network.
- A STOBA®-inside NCA battery with high energy design (> 2.5Ah) can 100 percent pass through GB/T nail tests, which is superior to Japanese (60 percent) and Korean (30 percent) batteries.

Potential Applications:

- To improve lithium battery safety in electric vehicles, mobile phones and other uses.
- In 2014, ITRI authorized Taiwan Mitsui Chemicals exclusive license to manufacture and sell STOBA®.
- In 2016, STOBA® was adopted by J.S. Power for developing a high safety battery module that is utilized exclusively in Sharp's home surveillance robot.
- More than 10,000 electric scooters are equipped with STOBA®-inside batteries in Taiwan.

About ITRI

Industrial Technology Research Institute ([ITRI](http://www.itri.org)) is one of the world's leading technology R&D institutions aiming to innovate a better future for society. Founded in 1973, ITRI has played a vital role in transforming Taiwan's industries from labor-intensive into innovation-driven. It focuses on the fields of Smart Living, Quality Health, and Sustainable Environment.

Over the years, ITRI has incubated over 300 innovative companies, including well-known names such as UMC and TSMC. In addition to its headquarters in Taiwan, ITRI has branch offices in the U.S., Europe, and Japan in an effort to extend its R&D scope and promote opportunities for international cooperation around the world. For more information, please visit <http://www.itri.org/eng>.