

Lithium ion Battery Commercialization

Johnson Controls-Saft Advanced Power Solutions, of Milwaukee, Wisconsin: Johnson Controls-Saft (JCS) will supply lithium-ion batteries to Mercedes for their S Class Hybrid to be introduced in October 2009. Technology developed with DOE support (the VL6P cell) will be used in the S Class battery. In May 2006, the Johnson Controls-Saft Joint Venture was awarded a 24 month \$14.4 million contract by the DOE/USABC to develop a 40kW Li ion HEV battery system offering improved safety, low temperature performance, and cost. JCS has reported a 40% cost reduction of the 40kW system being developed in their DOE/USABC contract while maintaining performance.



Lithium Ion Battery Material Commercialization

Argonne National Laboratory has licensed cathode materials and associated processing technology, developed under DOE's exploratory and applied battery R&D programs, to the Toda Kogyo Corporation. These advanced materials, a family of lithiated mixed metal oxide layered composite cathode materials, possess enhanced stability compared to conventional LiCoO₂ cathode material. These new materials incorporate electrochemically inactive components that are structurally integrated with electrochemically active components to form cathode materials with enhanced structural stability. Members of this family possess sufficient stability to allow charging to higher voltages, which in turn results in higher specific capacities (~250 mAh/g). This family of materials also includes lithium-rich NMC type cathode materials. The Toda Kogyo Corporation plans to manufacture these materials in a plant located in Sarnia, Ontario, Canada.

R&D100 Award

The R&D 100 award was given to the team of Argonne and EnerDel for the joint development of an advanced high-power Li-Ion battery system, based on the use of the lithium titanium spinel/Mn-spinel cell chemistry. This cell chemistry is extremely stable, leading to a battery system that is more inherently reliable and safe compared to other Li-Ion battery technologies. It possesses extremely high power and can achieve the 25kW power level at ~1/3 of the weight and volume goals established by the USABC. The high power is achieved because the cell possesses an internal impedance that is only 40% that of Li-Ion cells that utilize other cell chemistries. The battery can readily meet the USABC cold cranking requirements at -30°C and can cycle for thousands of cycles at 55°C. Also, the battery system is capable of charging and discharging within minutes with only a minor increase in temperature, e.g. cells can discharge within

1 minute with only a 50C temperature rise. EnerDel is currently evaluating this new Li-Ion battery technology in a modified Prius.