NASA SBIR 2008 Phase I Solicitation

X6.02   Advanced Space-Rated Batteries

Lead Center: GRC

Participating Center(s): JPL, JSC

Advanced human-rated energy rechargeable batteries are required for future robotic and human exploration missions. Advanced Li-based battery systems are sought for use on Exploration mission applications including power for landers, rovers, and Extravehicular activities (EVA). Areas of emphasis include advanced component materials with the potential to achieve weight and volume performance improvements and safety advancements in human-rated systems.

Rechargeable lithium-based batteries with advanced non-toxic anode and cathode materials and nonflammable electrolytes are of particular interest. The focus of this solicitation is on advanced cell components and materials to provide weight and volume improvements and safety advancements that contribute to the following cell level metrics:

- Specific energy of 300 Wh/kg @ C/2 discharge rate and 0°C;

- Energy density greater than 500 Wh/l;

- Calendar life of 5 years.

The cycle life requirements for these missions are relatively benign; the cycle life required at 100% Depth of Discharge (DOD) is in the range of 250 cycles.

Systems that combine all of the above characteristics and demonstrate a high degree of safety and reliability are desired. Innovative solutions that offer the cell level characteristics described above are of particular interest. Proposals are sought which address:

- Advanced cathodes with specific capacities >= 300 mAh/g at C/2 rate discharge and 0°C, and/or

- Advanced anodes with specific capacities >= 600 mAh/g at C/2 and 0°C with minimal irreversible capacity loss,

- Nonflammable electrolytes, and/or

- Electrolytes that are stable up to 5 volts.

Research should be conducted to demonstrate technical feasibility during Phase 1 and show a path toward a Phase 2 hardware demonstration, and when possible, deliver a demonstration unit for functional and environmental testing at the completion of the Phase 2 contract.