



NASA SBIR 2011 Phase I Solicitation

X8.02 Space-Rated Batteries

Lead Center: GRC

Participating Center(s): JPL, JSC

Advanced battery systems are sought for future NASA Exploration missions to address requirements for safe, human-rated, high specific energy, high energy density, and high efficiency power systems. Possible applications include extravehicular activities, landers, and rovers. Areas of emphasis include advanced cell chemistries with aggressive weight and volume performance improvements and safety advancements over state-of-the-art lithium-based systems. Novel rechargeable battery chemistries with advanced non-toxic anode and cathode materials and nonflammable electrolytes are of particular interest. Priority will be given to efforts addressing novel cathode materials that can be paired with advanced silicon anodes.

The focus of this solicitation is on advanced concepts and cell components that provide weight and volume improvements and safety advancements that contribute to the following cell level metric goals:

- Specific energy >350 Wh/kg at C/2 (Fully charged or discharged in 2 hours).
- Energy density > 650 Wh/l at C/2.
- Tolerance to abuse such as overcharge, external short-circuit, and over temperature.
- Calendar life >10 years.
- Cycle life >250 cycles at 100% depth of discharge.

Systems that combine all of the above characteristics and demonstrate a high degree of safety and radiation tolerance are desired. Cell safety devices such as shutdown separators, current limiting devices that inhibit thermal runaway, venting, and eliminate flame or fire; autonomous safety features that include safe, non-flammable, non-hazardous operation especially for human-rated applications are of particular interest.

Proposals should include analysis that demonstrates the potential of the proposed technology to meet the

projected performance parameters. Research should be conducted to demonstrate technical feasibility during Phase I and show a path toward a Phase II breadboard demonstration, and when possible, deliver a prototype/ demonstration unit for functional and environmental testing at the completion of the Phase II contract.