



NASA SBIR 2016 Phase I Solicitation

H8.04 Advanced Next Generation Batteries

Lead Center: GRC

Participating Center(s): JPL, JSC

Breakthrough battery cell technologies that far exceed the specific energy and energy density or temperature performance of state-of-the-art lithium-based cell technologies are required to achieve far-term energy storage goals for human and robotic missions to the moon, Near Earth Orbit, Venus, and Mars. NASA is seeking innovative, advanced electrochemical cell and battery technologies that can aggressively address requirements for these future missions. Proposed chemistries and components must meet performance goals while simultaneously delivering a high level of safety. Components and systems that can enable one of the following sets of cell-level performance goals (simultaneously, within the same system) are sought for specific missions:

- Extravehicular Activities. 450 Wh/kg, 1000-1500 Wh/L, >100 full cycles, >5 year calendar life, up to C/5 rate capability, operation at 0 to 40° C, retention of at least 90% of room temperature capacity during operation at 0°C, and tolerant to electrical and mechanical abuse (i.e., abuse does not result in fire or thermal runaway).
- Human Lunar and Mars Landers and Rovers. 300-375 Wh/kg, 1000-1500 Wh/L, up to 2000 full cycles, >10 year calendar life, >C/2 rate capability, operation at -60 to 30°C, and retention of at least 80% of room temperature capacity during operation at -60° C.
- Mars Ascent Vehicle - Quiescent capability. >250-300 Wh/kg, 1000-1500 Wh/L, few cycles, >15 year shelf life after activation and very limited cycling, and C-rate capability. Extremely high reliability and very low irreversible capacity loss required after 15 year quiescent period. Calendar life and reliable operation after quiescent period are paramount.

Offerors may propose to develop a single or multiple components, or a full cell system. Phase I proposals shall include quantitative analysis, scientific evidence, and technical rationale that clearly demonstrates how the proposed component or components will meet or contribute to the cell performance goals by the end of a Phase II effort. If a single component(s) is proposed rather than full cells, the Offeror shall also include in their justification of the proposed technology the performance that other advanced cell components must achieve in order to meet the claimed cell-level goals. Additionally, Phase I proposals shall describe the technical path that will be followed to achieve the claimed goals. Where possible, laboratory scale prototype hardware should be proposed as deliverables to NASA in Phase I.

Phase I Deliverables - Laboratory scale prototype hardware.

Phase II Deliverables - Incremental hardware deliverables and breadboard demonstration.