

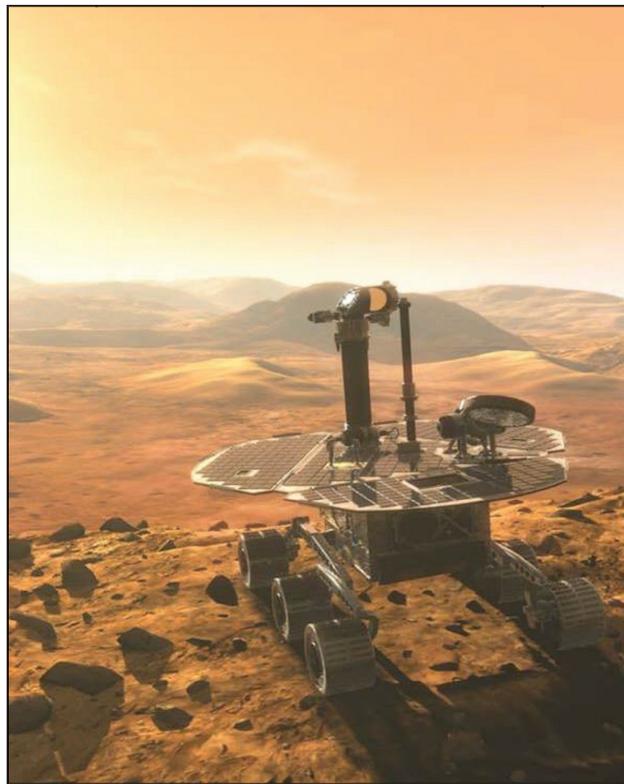


Air Force Research Laboratory | AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

PROPULSION DIRECTORATE DEVELOPS LITHIUM-ION BATTERY TO POWER MARS ROVERS



Lithium ion technology offers a three- to four-fold increase in gravimetric (Watt-hours/kg) and volumetric (Watt-hours/liter) energy densities and produces voltages in excess of three times the value of typical nickel-based battery systems such as nickel cadmium and nickel hydrogen. These advantages make lithium ion an attractive choice for energy storage systems where weight, volume, power, and mission duration are critical issues.



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Accomplishment

The Propulsion Directorate will complete another milestone in its development and transition of high-energy-density, rechargeable lithium-ion (Li-Ion) batteries when the National Aeronautics and Space Administration's (NASA's) Mars Exploration Rovers "Spirit" and "Opportunity" power up their solar array power subsystem for the first time on the red planet in January 2004. The world will see their success when the rovers begin collecting geological science data as part of NASA's Mars Exploration Rover project.

The deployed solar array power subsystem onboard the rover is driven by two 8 Amp-Hr Li-Ion batteries. Directorate scientists and engineers developed the technology, while the Jet Propulsion Laboratory (JPL) and Lithion, a division of Yardney Technical Products, developed the batteries. These jointly developed batteries will keep the rover "alive" at night and provide additional power during intensive daytime operations.

Background

Since its initiation, the Li-Ion program has attracted the attention and support of major aerospace firms and other Department of Defense components. The Air Force and NASA Glenn/JPL combined expertise and resources to address the many energy storage requirements facing future space missions.

The joint effort resulted in four contracts with major military battery developers, which address numerous mission applications. Battery developers will design, fabricate, and test cells and batteries for military and NASA low-earth-orbiting and geosynchronous satellites, advanced high-voltage aircraft applications, and unmanned air vehicles.

Propulsion
Technology Transfer

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-PR-23)