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INNOVATIVE LI-CO2 ENERGY STORAGE BATTERIES FOR SPACE APPLICATIONS

Abstract

Significant breakthroughs are required in energy storage systems to enable electrification of space missions. Battery chemistries used for the extreme operating conditions in the missions directed to the exploration of natural satellites of various planets, extravehicular activities, and several space applications are recently focused in research. Compared to today's incumbent lithium ion technologies, space batteries of the future must be able to achieve lower cost, lighter weight, improved safety, longer driving ranges, and lower environmental impact. Li-CO2 technology, as proposed here, will offer an order of magnitude higher energy density over current lithium ion batteries. This research project brings together all of the science and technology required to develop Li-CO2 battery. That is, significant advances will be made in the primary battery components and how they combine to operate as an efficient battery system. The final deliverable will be a small prototype that is practical, integrated, and under-pinned by a strong foundational, fundamental understanding of the underlying principles, thus greatly facilitating the next steps in the development cycle.