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HIGH SPECIFIC ENERGY 90AH LI-ION BATTERY FOR THE NEW LUNAR EXPLORATION  
VEHICLE

**Abstract**

Because of high specific energy and wide operation temperature, Li-ion batteries have been applied on many planet exploration vehicles, such as Opportunity, Mars Express, HAYABUSA and YH-1 Mars Probe. The New Lunar Exploration Vehicle requests higher specific energy. The 90Ah battery pack is constituted from fourteen 45Ah Li-ion cells with 2 cells in parallel and 7 two-paralleled-cells in series. With LiCoO<sub>2</sub> cathode and carbon anode, the specific energy of 45Ah Li-ion cell is 195Wh/kg. It can be charged or discharged at the temperature from -20 centigrade to +55 centigrade. The discharge capacity at -20 centigrade is 71.5% of that at +20 centigrade and 97.5% at +55 centigrade. The cell won't burn or explode even overcharged to 4.5V, over-discharged to 0V and short-circuited with 10mΩ resistance. The specific energy of 90 Ah battery is as much as 175Wh/kg. The 90Ah battery has passed the qualified tests, including sine vibration, random vibration, shock test and thermal vacuum. The capacity reduces 5.2% after finishing 1230 circles on-orbit-simulation without balance circle; and the voltage difference between the cells is less than 20mV.