

Sulphur Lithium Ion Power: a novel, high performance polymer tin/sulphur lithium-ion battery

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Although already in the market place, lithium batteries still require progress to meet the stringent requirements of the emerging applications, such as storage of intermittent energy sources and powering of sustainable vehicles. In particular, a further increase in energy storage, a better control of safety and a shift to cost-effective electrode and electrolyte materials, are mandatory steps. To meet these stringent demands, an appealing example is provided by the lithium-sulphur battery that exploits an electrochemical process having theoretical specific energy and energy density of 2,500 Whkg⁻¹ and 2,800 Whl⁻¹, respectively. Several issues, however, have so far prevented the practical development of this important lithium battery system. Here, we report an example of a lithium-metal-free, battery exploiting a new electrochemical concept involving the renewal of: i) the anode, changed from the conventional, highly unsafe lithium metal to a low cost, high performance tin-carbon nanocomposite; ii) the cathode, fabricated in the discharged state, namely in the Li₂S-C form rather than in the common S-C form and iii) the electrolyte, changed from the conventional, unstable liquid electrolyte to a reliable, plastic-like polymer electrolyte membrane.