

High Performance Lithium Ion Battery with Nano Porous Metal Current Collector

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Rechargeable lithium ion battery is a key technology in electronic market of modern society. However, lithium ion batteries fall short of satisfying the needs for safety and fast charging/discharging performance, which are highly desirable for applications in portable devices, power tools, electric vehicles or efficient use of renewable energies. Recently, it was reported that nano porous structure (pore size < 1 μm) has excellent capability to promote charge/discharge rates while keeping the high capacity retention of lithium ion battery. However, the current techniques to form nano porous structure by self-assembling, de-alloying or laser etching are time-consuming and even environmental pollution.

In this work, a low-cost and scalable ultrasonic method was developed to prepare nano porous metal current collector for high performance lithium ion battery. The preparation parameters, such as ultrasonic duration and concentration of nano-forming agent, have been carefully optimized. The morphology of as-prepared current collector was characterized by scanning electronic microscope. The surface area and pore size distribution were measured by BET method. Half-cell battery was used to evaluate the electrochemical performance of nano porous metal current collector. A 6Ah prototype of soft-packed pouch cell was assembled and the cycling stability was tested in comparison to commercial batteries.

References:

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