Short Communication

Structure and Electrochemical Properties of Hierarchically Porous Silicon Film Prepared with the Combination of Magnetron Sputtering Deposition and Metal-Assisted Chemical Etching

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A novel hierarchically porous silicon film on Cu foil was fabricated by employing the combination of magnetron sputtering deposition and metal-assisted chemical etching technology. The as-prepared porous Si film were directly used as working electrodes without adding of binder or electron conductive agent, which exhibited high specific capacities and stable cyclability. Specifically, a high initial discharge capacity of 1976 mAh g⁻¹ is attained at a current density of 300 mA g⁻¹ and a stable discharge capacity of 1629 mAh g⁻¹ obtained after 100 cycles. This superior electrochemical properties could be ascribed to the unique hierarchically porous structure, effectively buffering volume changes during the charge/discharge process.

Keywords: Hierarchically Porous Si film, Metal-assisted chemical etching, Magnetron sputtering deposition, Lithium-ion battery.

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