

Micro-patterned tin dioxide nanowires for anode of lithium-ion batteries with the polymer-based composite solid electrolyte

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Tin dioxide (SnO₂) with a high capacity of 782 mAh/g is in the spotlight as the next-generation electrode materials. The lithium polymer battery systems including the polymer-based electrolyte have been recently introduced to be used in mobile devices and electric vehicles for the high specific energy. In this work, one-dimensional SnO₂ nanowires (NWs) were directly grown on current collectors to enlarge the surface area in contact with the electrolyte, which contributes to high rate performances. The regular channels in the electrode were formed via a micro-patterning process, which could more improve the rate performances. The composite electrolyte consisting of polyethylene oxide (PEO) and lithium salt with the ceramic fillers of Al-doped Li₇La₃Zr₂O₁₂ was infiltrated into SnO₂ NWs. This electrolyte could prevent physically the volume expansion of SnO₂ NWs and help to suppress the deformation of the electrodes.