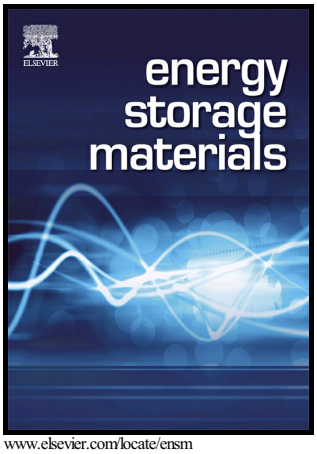

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Designing 3D Nanostructured Garnet Frameworks for Enhancing Ionic Conductivity and Flexibility in Composite Polymer Electrolytes for Lithium Batteries

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Abstract

Solid-state electrolytes provide excellent electrochemical stability, mechanical strength and safety as compared to conventional liquid electrolytes for lithium ion batteries. Recent developments of polymer electrolytes mixed with nanofillers have enhanced ionic conductivity and stability owing to the interaction between nanoscale fillers and polymer matrix/lithium salt. However, the agglomeration of the nanofillers limits the concentration of the filler, thereby preventing the composite electrolyte from further improving the conductivity and stability. In this study, we first report three-dimensional (3D) nanostructured garnet framework as 3D nanofillers for composite polymer electrolyte. The well-percolated structure of garnet framework enables a high weight ratio of 62 wt % in composite electrolyte and improves conductivity to 8.5