

Small-angle scattering studies of graft-copolymer electrolytes

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The fuel cell, using a polymer electrolyte, is a clean and efficient electrochemical energy conversion device and is attractive for portable electronics, distributed power source, and electric vehicle applications. The limited lifetime and the high cost of commercially available electrolytes, however, block the large-scale commercialization. Radiation-grafted copolymers have attracted considerable attention owing to the cost-competitive and versatile synthesis. The current focus is on (a) improving the chemical stability, (b) obtaining mechanical integrity at high ionic content, and (c) sustaining ionic conductivity at low water content. The phase-separated structure of the polymer electrolyte is a key parameter for (b) and (c), and small-angle scattering is an outstanding technique to study structure on the relevant length-scales. Insights into the certain relationships between fuel-cell-relevant properties and electrolyte structure will be presented.

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