

## Synthesis of Graft Copolymers and Their Use as Energy Materials

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Our work has been devoted to the study of polymeric materials, particularly self-organizing and nanostructured graft copolymer systems, for applications including fuel cells, solar cells, rechargeable batteries and separation membranes. The "grafting from" technology to prepare the well-defined microphase-separated structure of polymeric materials using atom transfer radical polymerization (ATRP) will be introduced in this presentation. Various amphiphilic comb copolymers were synthesized through this approach. Graft copolymers incorporating ion conducting groups are being explored as polymer electrolytes for fuel cells as well as solar cells. We also show that these materials can serve as a structure-directing agent for mesoporous metal oxide electrodes. Finally, we demonstrate the applicability of graft copolymers for CO<sub>2</sub> or olefin separation membranes.