Designs of Efficient Ion Conducting Polymers

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Abstract

Over the past decades, polymers with tethered ionic groups have been widely investigated as components of electrochemical devices to address the growing demand for clean energy. Despite steadfast efforts to these materials, quantitative understanding of the factors governing the transport properties of these materials is in its infancy. In this talk, I will present the controlled synthesis, self-assembly, and modulated ion clustering behavior of ion-containing polymers as the ways to improve their ion transport properties. The creation of well-defined self-assembled morphologies in such materials is particularly highlighted as a novel prospective. Moreover, confinement of ions to ordered nanoscale domains offered a platform for creating nearly homogeneous ionic phases with a radically decreased potential barrier to ion conduction. A new means to control the morphology and conductivity of block copolymer electrolytes by the inclusion of ionic units at the chain ends will be also addressed. With orthogonal control over the type and number of end groups in polymers, this approach permitted the synthesis of polymer electrolytes with controlled crystallinity, improved mechanical strength, and enriched nanostructures with significant enhancement in ion transport properties. Lastly, I will briefly introduce on-going work of our group that demonstrate the high potential of single-ion polymers with crystalline protogenic channels as high-conductivity polymer electrolytes.

Keywords: *Block copolymer electrolytes, fuel cells, proton conductivity, single-ion conductors*

Biography

Moon Jeong Park obtained her BS and PhD from Seoul National University, and Postdoctoral position at UC Berkeley. She is currently Professor at Department of Chemistry, POSTECH. She serves as an Associate Editor for Macromolecules (ACS). Her honors include John H. Dillon Medal of the American Physical Society (2017) and IUPAC Young Polymer Scientist Award (2016), and Young Scientist Award of Ministry of Science of Korea (2016). Her research interests include charge transport in soft materials.