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## Ionic liquid-based polymer electrolytes via surfactant-assisted polymerization at the plasma-liquid interface

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We first report an innovative method, which we refer to as interfacial liquid plasma polymerization, to chemically cross-link ionic liquids (ILs). By this method, a series of all-solid state, free-standing polymer electrolytes are successfully fabricated where ILs are used as building blocks and ethylene oxide-based surfactants are employed as an assisted-crosslinking agent. The thickness of the film is controlled by the plasma exposure time or the ratio of surfactant to ILs. The chemical structure and properties of the polymer electrolyte are characterized by scanning electron microscopy (SEM), Fourier transformation infrared spectroscopy (FT-IR), nuclear magnetic resonance (NMR) spectroscopy, X-ray photoelectron spectroscopy (XPS), differential scanning calorimetry (DSC), and electrochemical impedance spectroscopy (EIS). Importantly, the underlying polymerization mechanism of the crosslinked IL-based polymer electrolyte is studied to show that fluoroborate or halide anions of ILs together with the aid of a small amount of surfactants having ethylene oxide groups is necessary to form crosslinked network structures of the polymer electrolyte. The ionic conductivity of the obtained polymer electrolyte is  $2.28 \times 10^{-3} \text{ Scm}^{-1}$ , which is a relatively high value for solid polymer electrolytes synthesized at room temperature. This study can serve as a cornerstone for developing all-solid state polymer electrolytes with promising properties for next-generation electrochemical devices.

### Biography

Ho Suk Choi completed his PhD from the Department of Chemical Engineering of Purdue University in May, 1995. After short post-doctoral research at the Department of Chemistry of Purdue University, he joined to the Chungnam National University as a faculty member in September, 1995. Now, he serves as the Director of university specialization project in the field of energy materials and processes. He has published more than 160 papers in reputed journals.

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