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**Multi-stimuli responsive block copolymers and gels in ionic liquids** TAKESHI UEKI, MASAYOSHI WATANABE, Yokohama National University, WATANABE LAB. TEAM — Ionic liquids (ILs) are room temperature molten salts and have attracted much attention because of their unique properties. The characteristics of ILs (non-volatility, non-flammability, chemical stability, high ionic conductivity) can contribute to high performance energy-conversion materials. On the other hand, some polymers greatly change their solubility in ILs in response to external stimuli such as temperature and light. We have found that poly(*N*-isopropylacrylamide) (PNIPAm) and poly(benzyl methacrylate) (PBnMA) show upper critical solution temperature (UCST)-type phase behavior and lower critical solution temperature (LCST)-type phase behavior in an ILs, respectively. Most recently, we also discovered that certain polymers change their solubility induced by photo stimuli. In this study, we describe hierarchical self-assembly of multi block copolymer in IL. The ABC-triblock copolymer consists of PBnMA as A with a high LCST (105 °C) segment, IL-compatible PMMA as B, and PPheEtMA as C with a low LCST (42 °C) segment; the copolymer exhibits doubly thermo-sensitive self-assembly in IL to form an ion-gel. PBnMA and PPheEtMA (A and C) blocks are expected to aggregate at different  $T_c$ s.

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