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Molecular design and electronic properties of new doping system: Pure organic TTF-based salt-bridged crystals

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Crystal engineering with a supramolecular approach utilizing non-bonding interactions such as hydrogen bonds is a promising strategy for designing functional conducting organic materials. We have recently proposed a new doping method in salt-bridge supramolecular crystals, as the typical example of ammonium tetrathiafulvalene-2-carboxylate, $(TTFCOO\text{-}NH_4^+)_{1-x}(TTF\bullet{+}COO\text{-}NH_3)_x$, x=0.16, [$TTFCOONH_4$], where protonic defects are stabilized in high-dimensional salt-bridge network and play a role of a dopant giving rise to charge carriers in co-existing electron donor molecules, which is different from the mechanisms in established charge-transfer complexes and conducting polymers. The electronic properties of the resulting conducting crystals are very unique exhibiting isotope effects in the corresponding deuterated ammonium forms, which demonstrate strong coupling between holes and dynamic motions of ammonium protons in salt-bridge networks. In this presentation, the crystal structures and electronic properties such as the electrical conductivity, thermoelectric power, and magnetic properties of this doping system will be comprehensively demonstrated together with their particular isotope effects.

Biography

Yuka Kobayashi is a Principal Researcher at National Institute for Materials Science (NIMS) in Japan. She received her PhD degree in Physical Chemistry from the University of Tokyo in 2001. She was an Assistant Professor at University of Tokyo and an Associate Professor at Waseda Institute for Advanced Study (Waseda Univ.) till 2010. Her research interest is to design and synthesize of organic electroactive materials, which possess high potential for green innovation.

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