Design and Synthesis of Ruthenium-Based Metallosupramolecular Polymers for Electrochromic Application

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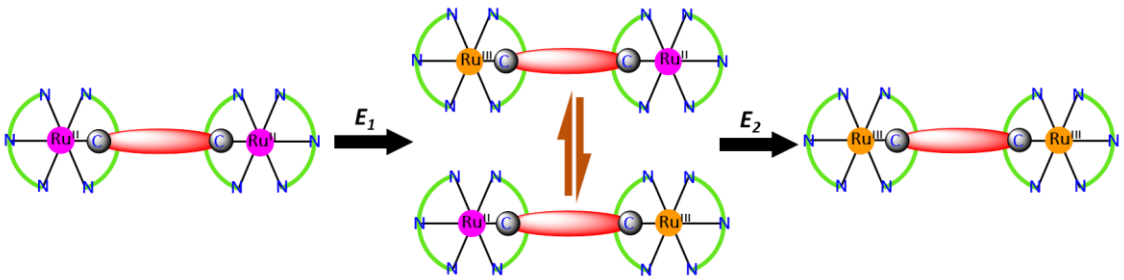
Metallosupramolecular polymers (MSPs) are composed of metal ions and ditopic organic ligands and well investigated towards the electrochromic (EC) property. The amorphous nature of the polymer materials has been a key factor for the EC device fabrication. In addition, the low voltage application, better coloration and long memory time are major advantages of MSPs as EC materials. In the Ru-based MSPs, the Ru ion coordinated with six nitrogen atoms forming an [NNN-NNN] backbone was investigated so far. However, it is expected that the different coordination backbones cause novel EC functions in Ru-based MSPs. Herein, we have designed a new type of Ru-based MSP containing an [NCN-NCN] backbone. Thus, the Ru ion has formed a direct covalent bond with a carbon atom.

As the model complex of the Ru-based MSP containing an [NCN-NCN] backbone, we synthesized a cyclometalated diruthenium complex to validate the presence of Ru-C covalent bonds (Scheme 1). The binuclear metal complex was synthesized in a 79% yield (column separated) and characterized through multinuclear NMR and mass spectrometry. The detailed synthetic procedure, the characterization data and the electrochemical redox behaviour of the binuclear metal complex will be shown in our presentation.



Scheme 1. An expected redox mechanism in the binuclear Ru complex.