

Chapter 12

Summary



This book has introduced the author's recent research on polymer design, synthetic methodologies, electrochemical/ionic/emissive properties, and the display device fabrication of Fe(II)-, Ru(II)-, Co(II)-, Cu(II)-, Pt(II)-, Ni(II)-, Cd(II)-, Mo(VI)-, and Eu(III)-based metallo-supramolecular polymers. The metallo-supramolecular polymers with a linear structure were prepared by the 1:1 complexation of the metal ions with ditopic ligands. As for polymer design, Fe(II)/Ru(II)-, Cu(I)/Fe(II)- and Eu(III)/Fe(II)-based heterometallo-supramolecular polymers were also described. The polymers were synthesized under the different complexation conditions for the two metal ion species or using an asymmetrical ligand. The metallo-supramolecular polymers with a hyperbranched structure were prepared using a tritopic ligand. The polymers showed various electrochemical/ionic/emissive properties including electrochromism, nonvolatile memory, and vapoluminescence. The Fe(II)-, Ru(II)-, Co(II)-, and Co(I)-based polymers exhibited blue, red, yellow, and black electrochromism, respectively. In addition, electrochromic display devices were successfully fabricated by combination with a gel electrolyte. The Fe(II)/Ru(II)- and Cu(I)/Fe(II)-based polymers exhibited multi-color electrochromism based on the different redox potentials between the metal ions. The ionic/protonic conduction in the Fe(II)-, Co(II)-, Ni(II)- and Mo(VI)-based polymer films at high humidity also proved interesting. A device with a polymer film served as a real-time humidity sensor. Regarding Ru(II)-, Zn(II)-, and Eu(III)-based polymers, unique emission properties were observed. The ON/OFF switching of emission was achieved with the Eu(III)/Fe(II)-based polymer.

Metallo-Supramolecular polymers are synthesized by the simple complexation of metal ions and multi-topic ligands. Therefore, the number of combinations of metal ion species and ligands is almost infinite. Not only the above-mentioned properties, but also other properties such as catalysts and magnetic behavior are expected to be found in these polymers. Actually, we are also investigating the biological applications of these polymers. The author hopes to arouse your interest in metallo-supramolecular polymers through this publication.