

Abstract

Functional ultrathin films could be prepared upon coordinative supramolecular assembly of polyiminoarylenes with terpyridine substituent groups in the side chain and divalent metal ions. The structure of the polymers was widely varied by insertion of different arylene units. The ability of the ligand molecules to complex the metal ions was first investigated in solution. Polyiminoarylenes with conjugated terpyridine substituent groups show strong ionochromic properties and are suitable as highly sensitive and selective sensor materials for metal ions. The coordinative interaction between metal ions and ligand molecules was utilized to build up film of coordination polymer networks upon layer-by-layer-assembly on solid substrates. The conditions of the film preparation (dipping time, rinse time, concentration of the dipping solutions, solvent) were optimized. The films are ionochromic and electrochromic. The colour of the film depends on the kind of metal ions used and changes during the application of an electric field. The influence of the polymer structure on the electrochemical (oxidation and reduction potentials, electrochromism) and electronic properties (electroluminescence, luminance, efficiency) were investigated. The electrochemical and electrochromic properties of the films could be varied and improved by incorporation of functional counter ions in the positively charged coordination polymer network. High stability, fast switching times and high contrast make the films interesting for technical applications. The reaction of the polymers and the coordination polymer films with acids and bases was also investigated. It was found that the polymers are chemically oxidized by treatment with acid in organic solvents. The positively charged, mainly aromatic and therefore rigid and porous network structure renders the films suitable as membranes and particularly as molecular and ion sieves, and ion exchangers, for example.