The Electrochromic Properties of an Alternative Copolymer Containing benzo[1,2-b:4,5-b']dithiophene as the Electron Donor and Benzoselenadiazole as the Electron Acceptor Units

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One novel electrochromic copolymer, poly(benzo[1,2-b:4,5-b']dithiophene-benzoselenadiazole) (PBDTBS) was synthesized successfully by chemical polymerization. Afterwards, some characterizations were carried out, including electrochemistry, spectroelectrochemistry, density functional theory(DFT) calculation, kinetics and thermal gravimetric analysis. When the copolymer is oxidized, it changes from greyish-green to darkgrey. The band gap of the copolymer calculated according to the onset wavelength of the optical absorption band is 1.55 eV. The optical contrast of the copolymer are 14.0 % at 450 nm, 9.0 % at 670 nm and 30.7 % at 1560 nm. The coloration efficiency are 60.61cm²·C⁻¹ at 450 nm, 84.60 cm²·C⁻¹ at 670 nm and 135.84cm²·C⁻¹ at 1560 nm. The decomposition temperature is 344 °C. It can be a candidate for the electrochromic application.

Keywords: conducting polymers, donor-acceptor type, benzo[1,2-b:4,5-b']dithiophene, benzoselenadiazole.

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