Electrosynthesis and Spectroelectrochemistry Properties of Copolymers Based on 3,4-Ethylenedioxythiophene and Quaterthiophenen Derivatives

Lanlan Shen^{1,2}, Zhiru Bai², Yu Jiang², Liying Li¹, Fengxing Jiang^{1,*}, Jingkun Xu¹, Huanhuan Qiu¹, Huixuan Liu¹, Rongri Tan^{1,*}

¹ Department of Physics, Jiangxi Science and Technology Normal University, Nanchang 330013, P. R. China.

² Jiangxi Engineering Laboratory of Waterborne Coatings, Jiangxi Science and Technology Normal University, Nanchang 330013, P. R. China.

*E-mail: f.x.jiang@live.cn (F. Jiang) and rogertanr@hotmail.com (R. Tan)

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Based on quaterthiophenen, bisethyleneoxyl are appended to thiophene rings (2,5-bis(2,3-dihydrothieno[3,4-b][1,4]dioxin-5-yl)thieno[3,2-b]thiophene, BED-TT) for modified monomer structure and obtain a lower onset potential as well as strong electron donor properties. Different molar ratio copolymers of BED-TT with 3,4-ethylenedioxythiophene (EDOT) was electrochemically synthesized, and the effects of changes in the amount of EDOT on the electrochemical and spectrochemistry properties of the copolymers were tracked. The resultant copolymer P(BED-TT-co-EDOT) was characterized via cyclic voltammetry, Raman, and spectroelectrochemistry. The study found that the amount of EDOT in the mixed system of BED-TT and EDOT can regulate the oxidation potential, electrochemical activity, and redox process of polymer films to a certain extent. The spectroelectrochemical results revealed that the copolymer P(BED-TT-co-EDOT) has a narrower optical band gap (1.63-1.67eV) and a richer electrochromic color (from pink purple, purple to gray blue, blue).

Keywords: quaterthiophenen; EDOT; copolymer; electrochemistry; spectroelectrochemistry;

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