

Synthesis of 3',4'-disubstituted terthiophenes. Characterization and electropolymerization. I. 3',4'-Dibromo-2,2'-5',2''-terthiophene in photovoltaic display

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Abstract

Recent studies on conducting polymers have demonstrated that polymers of 3-substituted thiophene produce very stable compounds. Although this kind of substitution improves the regularity, structural defects still exist. To overcome this drawback, the polymerization of 3,4-disubstituted thiophene is proposed as a convenient way of synthesizing regular, highly conjugated conductive polymers. Our interest is thus focused on the synthesis of tetra-substituted thiophene derivatives, their polymerization, electrochemical properties, spectral characteristics, oxidizing potential, and the feasibility of photocells development. In this article, we report the synthesis and characterization of 3',4'-dibromo-2,2'-5',2''-terthiophene which, as such or modified, may be a good starting product for obtaining new monomers of 3',4'-disubstituted terthiophenes, that would allow the effect of the substituents on the properties of the respective polymers to be studied. In addition, the monomer was electropolymerized and the resulting deposit was electrochemically and morphologically characterized. Two conclusions were drawn- first, more uniform and homogeneous layers than those of polythiophene are obtained- second, the thin layers of the polymer, electron acceptors, absorb in the visible. Finally, photocells were assembled to investigate their photovoltaic effect. Although the so prepared solar cells showed some photovoltaic effect, the yield was low.

Keywords

Conjugated polymers, Heteroatom-containing polymers, Electrochemistry, Conducting polymer.