The synthesis and characterization of a series of quaterthiophenes (4Ts) with thiolate groups protected with 2-cyanoethyl (CNE), 2-trimethylsilylethyl (TMSE), and acetyl (Ac) groups are described. Sequential cleavage of these different protecting groups allows for the preparation of 4Ts derivatized with ferrocene and/or alkanethiol chains. The electrochemical behavior of these compounds has been analyzed in solution by cyclic voltammetry (CV). A ferrocene-derivatized dithiol 4T 14 and a dithiol 4T 15 with two TMSE-protected thiolate groups have been immobilized on a gold surface as monolayers that have been characterized by CV, ellipsometry, contact-angle measurement, and X-ray photoelectron spectroscopy (XPS). The results show that molecules 14 and 15 are doubly grafted with a horizontal orientation of the conjugated system relative to the surface. Furthermore, application of the deprotection/alkylation sequence of the remaining protected thiolate groups on a monolayer of 15 allows for efficient post-functionalization.
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