



Influence of Molecular Organization on the Electrical Characteristics of π -Conjugated Self-Assembled Monolayers

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Résumé en anglais	<p>Two new thiol compounds with σ-π-σ structure were synthesized and self-assembled on gold substrates. The morphology and the structural characterization of SAMs assessed by infrared spectroscopy, contact angle, XPS, electrochemistry and scanning tunneling microscopy (STM) show the formation of monolayers. SAMs with a terthiophene (3TSH) core as conjugated system are much better organized compared to those with a naphthalene carbodiimide (NaphSH) core as demonstrated by the cyclic voltammetry and STM studies. The surface concentration of 3TSH and NaphSH is, respectively, three and six times lower than ordered SAMs of pure alkyl chains. A large number of I/V characteristics have been studied either by STS measurements on gold substrates or by C-AFM on gold nanodots. Transition voltage spectroscopy (TVS) was used to clearly identify the transport in these partially organized monolayers. The chemical nature of the conjugated system, donor for 3TSH and acceptor for NaphSH, involves an opposite rectification associated with the asymmetrical coupling of the molecular orbitals and the electrodes. The conductance histograms show that the 3TSH junctions are less dispersed than those of NaphSH junctions. This is explained by a better control of the molecular organization in the molecular junctions.</p>
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