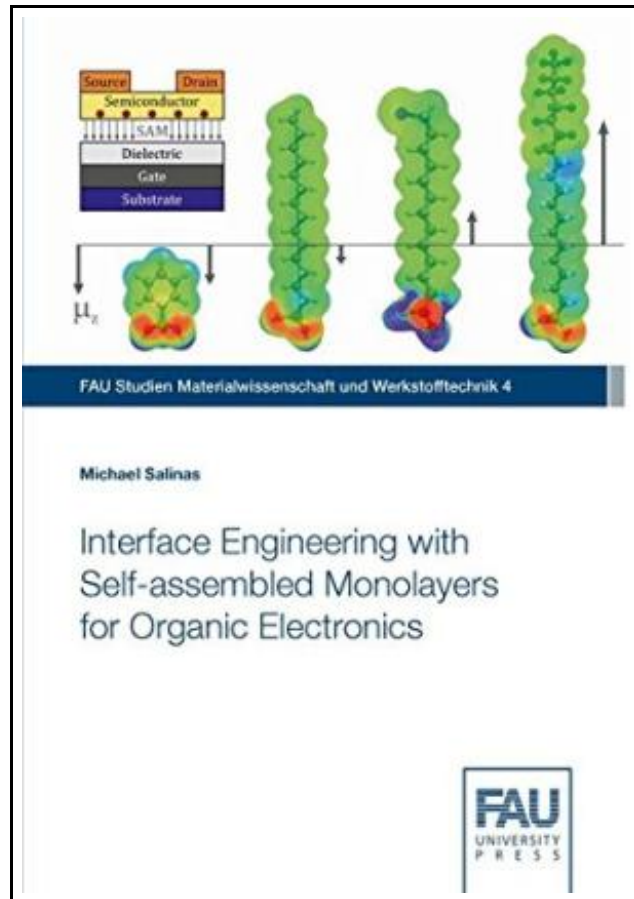


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INTERFACE ENGINEERING WITH SELF-ASSEMBLED MONOLAYERS FOR ORGANIC ELECTRONICS



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FAU University Press Aug 2014, 2014. Taschenbuch. Book Condition: Neu. 211x152x12 mm. Neuware - The work presented in this thesis focuses on the impact of densely packed dipolar self assembled monolayers (SAMs) on the electrical characteristics of organic electronic devices. The main achievement was in deducing the relationship between the dipolar character of self-assembled monolayers applied as part of a hybrid dielectric and the switching behavior of organic thin-film transistors (OTFTs). Further important aspects of this work are the general understanding of material properties that contribute to the electrical device characteristics and the estimation of the magnitude of their contribution to specific electrical device parameters. The approach presented in this thesis combines experimental methods applied for the determination of different SAM properties (relative permittivity, layer thickness and packing density) and computational methods applied for the calculation of SAM dipole moments and work functions of organic semiconductors. A model that correlates the threshold voltage shift with the electrostatic potential of a SAM is proposed. The quantitative correlation is supported by the good agreement of calculated values with experimentally determined parameters of the transistors. The change of the charge carrier density in the semiconductor is explained by charge rearrangements induced by the dipole moment of the SAM. Photoconductive and photovoltaic effects in OTFTs were investigated by using SAM molecules with an electro-optical functionality. This approach provided the possibility to tune the photoinduced charge transfer at the interface of semiconductor and SAM. Finally, electron extraction layers of organic solar cells (OSCs) were modified with C60 functionalized SAM molecules, improving the charge transfer to the active material. The modification led to increased fill factors and short circuit current densities of the OSCs. 125 pp. Englisch.



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