P-FKP7: Novel methods in the C(U)-analysis of organic MIS-structures

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The analysis of the behaviour of MOS-like structures of organic semiconductor devices can provide useful information about intrinsic properties of the semiconductor as well as of the insulator material. Depending on the sign and the value of the bias voltage, information about the dielectric constant, substrate (semiconductor) doping, charges in the dielectric layer and at the interface between dielectric and semiconductor is available via the measurement of the oxide-capacitance in accumulation and inversion regime, flatband voltage and their difference to the predicted theoretical value, etc. For organic semiconductor devices like field effect transistors, the optimization of each material itself regarding its intrinsic properties and the forming of structurally and chemically pure interfaces is of vital importance. We have investigated C=f(U) on different organic semiconductor systems and we present results on the influence of different parameters: If dealing with thin film of small molecules grown by thermal evaporation, growth parameters like average and initial evaporation rate, substrate temperature, substrate precleaning, residual gas composition in the vacuum chamber play a significant role for the microscopic layer formation and consequently for the semiconductor properties as well as the material purity. Spin-Coating processes for the fabrication of the dielectric layer not only determine the dielectric properties but also the interface between dielectric and semiconductor (an important influence have e.g. solvent residuals and their possible diffusion into the semiconductor layer with subsequent degradation acceleration). Last but not least illumination studies have been performed and related to intrinsic trap filling and carrier release processes.

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