A M Anton et al., J Material Sci Eng 2016, 5:6(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.043

IR TMOA-Infrared Transition Moment Orientational Analysis as a valuable method to determine the spatial orientation and order of distinct subunits in polymeric systems

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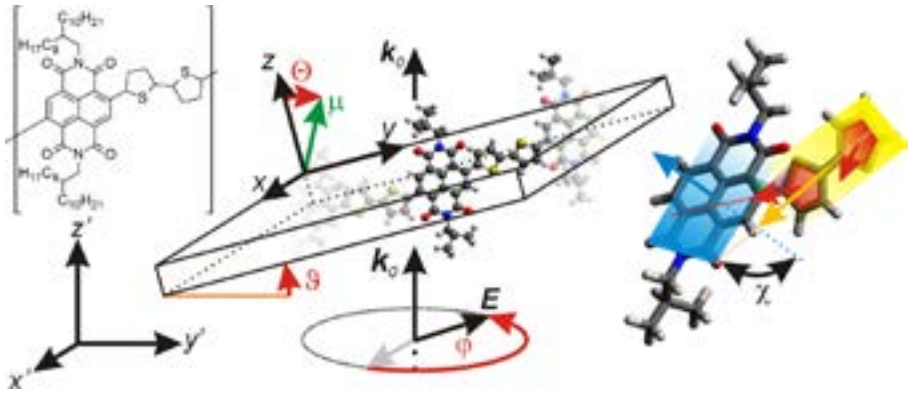
IR-TMOA as a valuable method to determine the spatial orientation and order of distinct subunits in polymeric systems: on the basis of their versatile usage in organic field, it effects transistors or solar cells in conjunction with their soft matter properties, such as flexibility and convenient adaption of shape, donor/acceptor conjugated copolymers which have received great attention as a fascinating class of materials. In order to tailor the macroscopic properties of their films, a detailed understanding of the corresponding molecular organization is required. For that reason, the method of IR-TMOA, is employed to elucidate the spatial orientation and order in thin layers of P(NDI2OD-T2). The spectral absorbance of selected bands is evaluated in dependence on the inclination (ϑ) and the polarization (ϑ) of the incoming light, which allows examining the absorption tensor for the distinct structural moieties independently. As a result, the orientation of atomistic planes defined by the naphthalenediimide (NDI, blue) and bithiophene (T2, yellow) subunits is determined in relative to the substrate (Θ), and hence, relative to each other (χ). Whereas, in spin coated films the T2 units exhibit a preferential *face on* or *edge on* alignment conditioned by the solvent, but the NDI parts are not affected. Furthermore, pronounced in-plane anisotropy of the NDI segments is evident in a 150 nm thin film demonstrating self assembled long range order of the polymer chains, even though they are spin coated from solution.



Schematic of the IR TMOA measurement geometry. [2] The combination of inclination(ϑ)- and polarization(φ)-dependent analysis enables to determine the orientation of atomistic planes relative to the substrate (Θ), and hence, relative to each other (χ).

Biography

A M Anton has completed his Physics study in the biophysics group of Prof. Dr. Petra Schwille at the Technische Universität Dresden. Then he switched to the Molecular Physics group of Prof. Dr. Friedrich Kremer at the University of Leipzig. Currently, he carries out the research on molecular orientation and order in soft matter systems, as (bio)polymers like spider silk or A (1 40) as well as semi-conductive polymers like P(NDI2OD T2).

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