OPTEXC

invited speaker series

UNIVERSITÄT BAYREUTH

Putting Disorder in Order: Modelling photoexcitation dynamics in disordered semiconductors*

Organic semiconductors are inherently disordered materials, either due to molecular conformation or due to the dielectric environment. The presence of disorder has been long considered as detrimental for the operation of organic optoelectronic devices, and a common misconception exists, that in practical device applications at room temperature, equilibrium transport prevails. In this presentation, I will address recent developments in understanding the role of disorder on the electronic and transport properties of molecular semiconductors by using Monte Carlo, electronic structure calculations and analytical theory, when available. I will firstly lay emphasis on the temporal and spatial transport of neutral and charged excitations. The distinction between equilibrium and nonequilibrium transport is quite a subtle one and the transport regime is not uniquely defined only by temperature. Subsequently, I will focus on the problem of charge separation in donor-acceptor organic solar cells. Several mechanisms have been suggested to influence charge generation and many contradicting experimental and theoretical reports have appeared over the last decade. By combining spectroscopy and photocurrent experiments with analytical and Monte Carlo simulations, we illustrate how interfacial energetics and transport topology reduce the activation energy required to separate the interfacial electron-hole pair.

Date: Tuesday, 28 May 2024 | time: 9.00 am | Raum: NWI, S35

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