Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

IRTG-Lecture

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"Good vibrations in organic semiconductors: combining impedance and Raman spectroscopy to study electrical transport in organic semiconductors"

Organic semiconductors offer many advantages for energy conversion, saving and storage applications. However, the poor electrical properties of organic semiconductors, particularly low carrier mobilities, are a critical limitation for real applications. Surprisingly, carrier transport is still not well-understood in organic semiconductors[1], making it difficult to develop design strategies for high mobility materials. Static disorder models are often applied to understand carrier transport in experimental studies on organic semiconductors[2], however, there is an increasing number of reports indicating the importance of considering the effects of dynamic disorder[3,4]. New experimental strategies are needed to correlate dynamic relationships between molecular structure and electrical transport in this class of materials. In this talk, I will present our current work on developing a new measurement approach which combines Raman and impedance spectroscopies. By monitoring the vibrational fingerprint of the organic semiconductor as a function of electrical perturbation, we investigate the influence of charge rearrangement on molecular vibrations and interactions. With these results we aim to correlate molecular interactions with macroscopic electrical properties and device performance.

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4. A. A. Y. Guilbert, M. Zbiri, M. V. C. Jenart, C. B. Nielsen, J. Nelson, J. Phys. Chem. Lett.10.1021/acs.jpclett.6b00537

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