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**Intrinsic transport and photo-physical properties of high-mobility organic single crystals**

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Small-molecule organic semiconductors form the basis for the emerging field of organic optoelectronics. In order to better understand the intrinsic photo-physical and transport phenomena in this important class of materials, it is necessary to study samples of very high structural order and chemical purity. Such materials exist in the form of molecular single crystals that can be used for fabrication of high-performance prototype devices, such as field-effect transistors, photo-conductors and photo-voltaic cells, in which intrinsic properties of organic semiconductors can be investigated without parasitic effects of disorder (see, e.g., [1,2]). This talk will cover the recent progress in organic single-crystal device electronics. In particular, several phenomena related to the previously discovered long-range triplet exciton diffusion and surface photocurrent generation (see, e.g., [3]) will be discussed.

[1] M. E. Gershenson, V. Podzorov, A. F. Morpurgo, "*Colloquium*: Electronic Transport in Single-Crystal Organic Transistors," invited review, ***Rev. Mod. Phys.*** **78**, 973 (2006).

[2] V. Podzorov et al., "Hall effect in the accumulation layers on the surface of organic semiconductors," ***Phys. Rev. Lett.*** **95**, 226601 (2005).

[3] H. Najafov, B. Lee, Q. Zhou, L. C. Feldman and V. Podzorov, "Observation of long-range exciton diffusion in highly ordered organic semiconductors," ***Nature Mater.*** **9**, 938 (2010).