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## **Morphology and Environment Dependent Luminescence of Dye Aggregates**

Organic crystals are attractive materials for opto-electronics and as light harvesting systems. They show high flexibility in preparation, so that they can allow one to arrange for landscapes which are beneficial to respective processes, such as field enhancement, energy transport, and charge separation. Upon illumination, Frenkel excitons are generated in molecule crystals, similar to Wannier excitons in ordinary semiconductors. In the quest for enabling longer energy transfer paths, the aim is to transport excitons over longer distances through the aggregate. Singlet excitons come along with Forster transfer mechanism and fluorescence, while triplet excitons with Dexter transfer and phosphorescence.

As a first step to answer the question which types of excitations are present and how they depend on structural features and the environment, we investigate morphology, fluorescence, and phosphorescence by correlative microscopy methods of molecule aggregate structures. For that, Copper-based porphyrin [1] aggregates are formed on Si substrate via self-organization. Among the different observed morphological motifs of the aggregates, we focus on isotropic structures and branched strands with typical heights of 30 to 250 nm as well as micro-fiber crystals with wave guiding properties. We further present our results on the effect of metallic nanostructures in the vicinity of the aggregates and address the role of these metal systems as local sources of enhanced excitation fields.

[1] M.J.J. Coenen, et al., Phys. Chem. Chem. Phys. 15, 12451 (2013).

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