

Bio-inspired dye assemblies for supramolecular electronics

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Self-assembled supramolecular functional units that are suitable for a directional exciton and charge carrier transport on a scale of up to hundred nanometers will be developed by covalent modification of a tubular dye aggregate that Mother Nature has created on the basis of strong excitonically coupled metallochlorins for photosynthesis. The self-organization of these building blocks leads preferentially to tubular nanoaggregates (with a diameter of 5 - 10 nm), or depending on their structural features and aggregation conditions, to linear or 2-dimensional aggregates. Covalent fixation of these metallochlorin dye aggregates by metathesis reaction or photo-crosslinking, template-directed aggregation and deposition on surfaces and contacting with nanoelectrodes will provide novel supramolecular (semi-)conductor devices, on which the concept of supramolecular nanoelectronics, i.e. a technology based on self-organized pi-pi-conjugated functional units, can be verified. A successful development of this project should open the way to easily accessible alternatives to e.g. carbon nanotube structures for a wide range of electronic applications.

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