Visualization of Energy Transfer on Self-assembled Naphthalenediimides Nanofibers Towards Perylenediimide Guest Through Fluorescence Microscopy

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The directional excitation energy transport in the supramolecular assemblies is useful for the development of organic optoelectronic devices and next-generation solar cells.[1] However, less precise control over the distance and organization of the molecular units including inhomogeneity and defects can be considered as major drawbacks of such nano-antennae systems.[2a] Previously, we reported the self-assembly of a Naphthalenediimide (NDI) into nanofibers that showed an efficient light-harvesting towards Perylenediimide (PDI) molecules through host-guest interaction in methylcyclohexane (MCH) rich solution.[2b] Herein, this efficient light-harvesting property of NDI nanofibers in the films can be vividly visualized using fluorescence microscopy with energy transfer as a probe (Figure 1). In combination with AFM, spectral analysis and polarization, a comprehensive understanding of the inhomogeneity, packing defects, and positioning of their constituent NDI and PDI molecular units has been established that were found to affect the exciton mobility along such nanofibers.

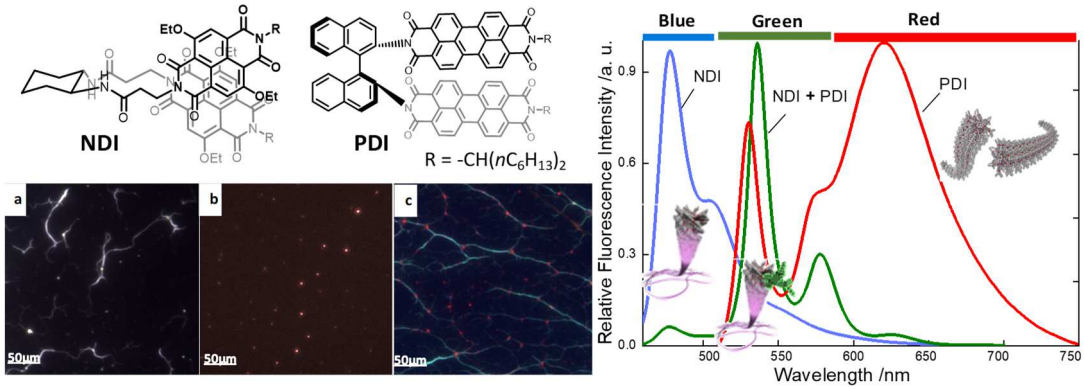

Figure 1. (Top, Left) Molecular structure of NDI and PDI, (Right) relative overlap between the emission spectrum of NDI, NDI in presence of 1.5 mol % of PDI and PDI in MCH rich solution (Inset: schematic representation of their self-assembly) with emission filters (blue, green and red) used in microscopy imaging, and (bottom, Left) their corresponding fluorescence microscopy images that drop cast on the glass slides in the film state.

References.

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