Energy transfer in molecules/nanotubes supramolecular assemblies

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The delocalized π-electronic system of carbon nanotubes allows them to link non-covalently to a large variety of organic molecules. In contrast to covalent functionalization, this mild interaction preserves most of the intrinsic nanotubes properties (photoluminescence, mobility…) but still leads to a strong enough coupling so to give stable supramolecular assemblies and to induce new and efficient functionalities [1]. We focus on nanotubes / chromophores compounds where the latter acts as a nano optical antenna that absorbs light and then transfer almost 100% of the energy to the nanotube [2, 3, 4, 5].

Compounds made of different chromophores such as metal- or free base porphyrins, porphyrin polymers, and cyanines were synthesized by means of the micelle swelling method [1, 7, 8]. Energy transfer was analysed both on ensembles [5, 6] and at the single compound level [9]. We will first discuss the energy transfer mechanisms in these kinds of supramolecular assemblies [5-9]. In a second part, we will show that the new functionalities created by the molecules allow to gain new insight into the intrinsic electronic properties of nanotubes [10] .

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