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abstract

Photophysical properties of poly(3,4-ethylenedioxythiophene)/permethylated β- and γ- cyclodextrin polyrotaxanes

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Abstract. Poly(3,4-ethylenedioxythiophene) (PEDOT) is well known as an interesting semiconducting material whose properties are of great interest for application in various optoelectronic fields. Since the solubility of PEDOT compound is a critical element for the application, different synthetic procedures such as the encapsulation of PEDOT backbone into the macrocyclic cavities *via* noncovalent interactions have been applied. Thus, our efforts are being made in this direction and we report here the photophysical properties of PEDOT·TMe-βCD and PEDOT·TMe-γCD polyrotaxanes. Chemical structures of the investigated compounds are illustrated in Figure 1.

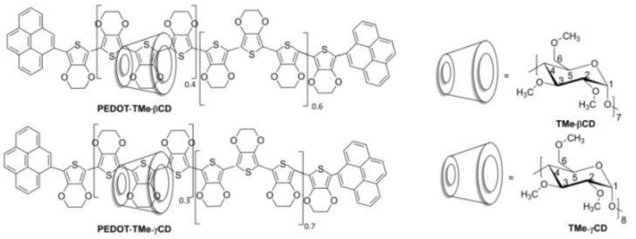

Figure 1. Chemical structures of PEDOT·TMe-βCD and PEDOT·TMe-γCD polyrotaxanes.

Herein, we continue to furnish a comprehensive knowledge into the effect of permodified cyclodextrin encapsulations on the optical properties of PEDOT·TMe-βCD and PEDOT·TMe-γCD solutions in water and acetonitrile (ACN) using transient absorption and time-resolved fluorescence spectroscopy. The nanosecond transient absorption (nsTA) maps of PEDOT·TMe-βCD and PEDOT·TMe-γCD revealed in the range 270-315 nm ground state bleaching bands (GSB). At shorter wavelengths from 210 to 250 nm occurred some excited state absorption bands (ESA) and more than one excited state (Sn > 1). At longer wavelengths (390 and 455 nm) appeared two negative bands assigned to the simulated emission (SE). The presence of SE bands ascribed to the triplet manifold confirms the phosphorescence (PH) properties of both compounds. We also note that PEDOT·TMe-βCD and PEDOT·TMe-γCD exhibited both Φ_{PH} and Φ_{FL} in ACN, whereas in H_2O these efficiencies are too low, evidencing mainly nonradiative pathways.

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