CHEMISTRY
A EUROPEAN JOURNAL

Non-covalent one-to-one donor–acceptor assembled systems based on porphyrin molecular gels for unusually high efficiencies in electron transfers

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Abstract: In this paper, we demonstrate a new approach for fabricating donor–acceptor assembled systems. Our strategy is based on the *J*-type ordered aggregation of a low molecular zinc porphyrin derivative and the subsequent integration of a pyridylated fullerene derivative with coordination and orientation onto the porphyrin aggregates. Our system achieves unusually high efficiencies in the case of fluorescence quenching during one-to-one mixing of the donor and acceptor. Moreover, the Stern-Volmer constant (K_{SV}) and association constant (K) of this system are 2,520 and 56 times higher, respectively, than those of the corresponding non-assembled system. We have also demonstrated that the quenching efficiency is thermotropically switchable since order-to-disordered transitions are essential characteristics of non-covalent low molecular assemblies.

Non-covalent D-A Assembly

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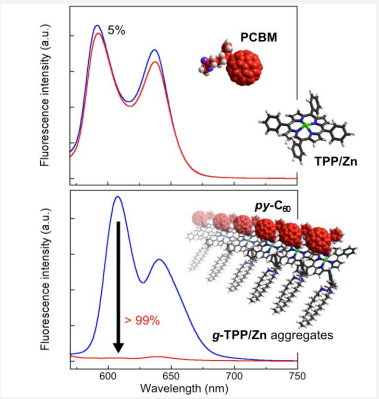

Non-covalent one-to-one donor–acceptor assembled system (***g*TPP/Zn + *py*-C_{60}**) achieves unusually high efficiencies in electron transfer