PBI-Porphyrin Dyads: Synthesis, Structure and Photophysical Properties

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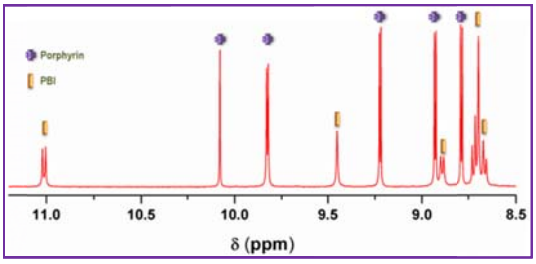
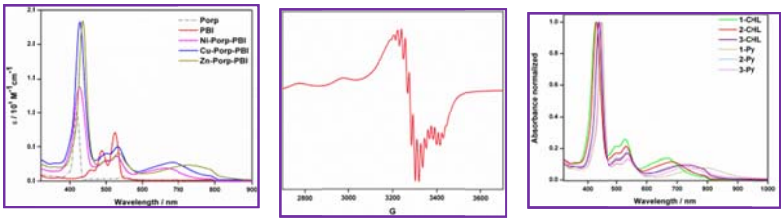
Abstract:
Due to the structural resemblance of porphyrinoids to natural light harvesting system, members of porphyrin family are attractive donor/bridge candidates for D-A systems. Many synthetic models of porphyrinoids have been developed as photoactive materials for OPVs. Especially, their metallated analogues are paramount in light harvesting and biological electron transfers. While these tetrapyrrolic macrocycles can be considered for synthetic light harvesting antenna complexes, their absorption characteristics are confined to near-ultraviolet (NUV) range which limits their harvesting efficiency. In porphyrins, the optical and electrochemical energy levels can be tuned via the modification of central metal and /or the introduction of suitable substituents at peripheral positions on the macrocycle. Further, efficient light harvesting from these macrocycles is realized by linking various accessory pigments. Perylenebisimides can be ideal accessory system for porphyrins as they absorb strongly in the visible region where porphyrin absorption is limited and are exceptionally stable. However, limited efforts have been devoted to the development of donor-acceptor dyads and triads constituting PBI and porphyrin chromophores. In this context, herein, we describe the synthesis and characterization of PBI-Porphyrin adducts that would maintain the electronic interaction between the chromophores while alleviating the chance of aggregation. It is important to mention here that it is for the first time that covalently-linked PBI-Porphyrin conjugated dyads with various metals have been investigated for opto-electronic applications.





References and Notes:

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