Poster Presentation

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Porous porphyrin organic polymer for visible light triggered hydrogen production

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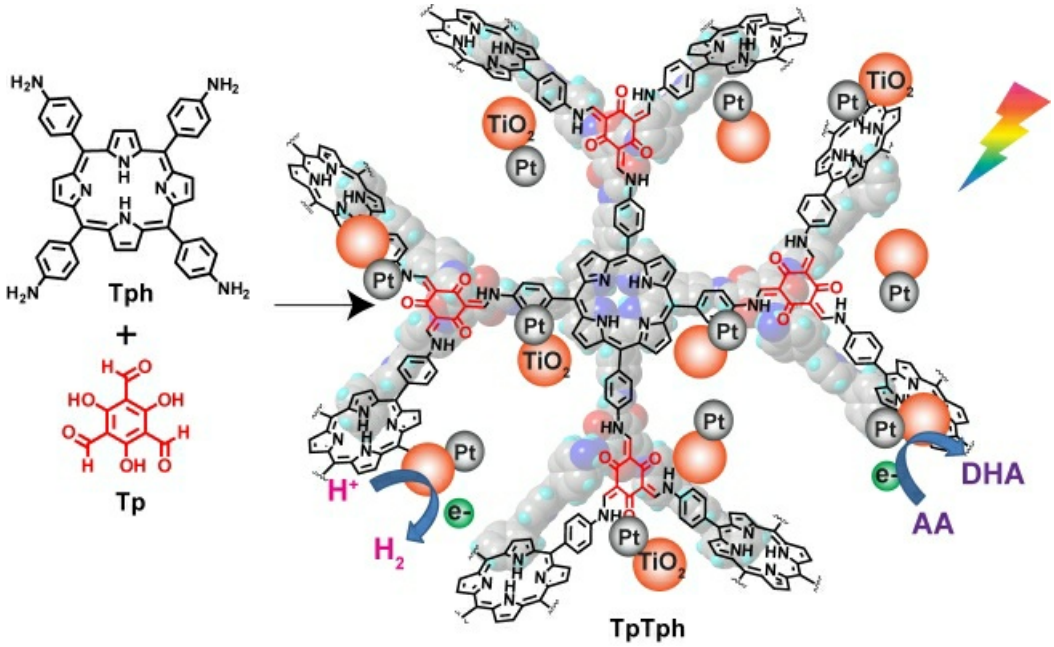
Developing highly efficient photocatalyst for water splitting is one of the key challenges in solar energy conversion. Here, we report the design and synthesis of a Porous Porphyrin Organic Polymer (PPOP), TpTph with keto-enol tautomerism functional linkage. TpTph is well stable in water, acid as well as base for a week. Further, the polymer features a good surface area, and is explored for its application as a photocatalyst in hydrogen production from water splitting. TpTph polymer is used to harbor TiO2 nanoparticles for its photoactive properties. Interestingly, the composite (TpTph-TiO2) performs remarkably as a photocatalyst in hydrogen production from water and outperforms the parent precursors in the photocatalytic activity. The design mimics natural photosynthetics systems with the polymer component to harvest photons. Although a number of examples of photocatalysis with metallated porphyrin are available, those with free base form/ non-metallated porphyrin are scarce. This is the first report demonstrating a non-metallated porphyrin based POP with amazing chemical stability acting as an efficient photocatalyst. This study provides an insight to the photosensitizing ability of the polymer in addition to its ability of firmly harboring nanoparticles onto its surface. Further, the study demonstrates that the presence of porphyrin units in TpTph makes the composite an excellent supporting material for semiconductor nanoparticles besides effectively separating the photogenerated electron-hole pairs. Notably, the catalyst is readily recoverable and reusable, with little loss in handling.

1. McKeown, N. B. & Budd, P. M. (2006) Chem. Soc. Rev., 35, 675- 683.
2. Kandambeth, S., Mallick, A., Lukose, B., Mane, M. V., Heine, T. & R. Banerjee, (2012) J. Am. Chem. Soc. 134, 19524-19527.
3. Thote, J., Aiyappa, H. B., Deshpande, A., Diaz Diaz, D., Kurungot, S. & R. Banerjee, (2014) Chem. Eur. J., 20, 15961-15965.



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