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Supplementary Information

Arginine-induced porphyrin-based self-assembled nanostructures for photocatalytic

applications under simulated sunlight irradiation

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Materials and Methods

Materials

All chemicals were used as received without any further purification. L-/ D- arginine were obtained from Sigma Aldrich (Bengaluru, Karnataka, India). Chemicals such as dry acetone, propionic acid, dichloromethane, chloroform, sodium hydroxide (NaOH), potassium hydroxide (KOH) and ethanol were purchased from Ajax Finechem. Australia.

Synthesis of H₂TCPP

By using literature procedure H₂TCPP was synthesized and characterized by modern spectroscopic methods (see ESI for details synthesis).^{S1}

H₂TCPP supramolecular nanostructures via arginine-induced self-assembly

First, 8 mg of TCPP was dissolved in 1 mL of 0.2 M NaOH solution. This is assigned as the guest solution. The host solution was prepared by dissolving L-/D- arginine with various concentrations in 20 mL of 0.01 M HCl solution. Subsequently, the guest solution was added dropwise into the host solution under stirring at room temperature in the dark for 1 hour. The obtained green aggregates were, then, filtered and dried for further characterizations.

Photocatlytic Investigation

Photocatalytic performance of the porphyrin nanobelt was evaluated by the degradation of RhB in aqueous solution. In a typical photodegradation measurement, 0.1 mg of hybrid material was dispersed in a 20 mL aqueous solution of RhB dye with a concentration of 5 mg L⁻¹. The dispersion was stirred in the dark for 30 minutes to establish an adsorption/desorption equilibrium before irradiation. The sunlight source for the photocatalytic reaction was a 1500 W air cooled Xenon lamp. At appointed times, 1.5 mL of dispersion aliquots were taken out and centrifuged to remove photocatalyst. The photocatalyticperformance of the as-fabricated samples for RhB degradation was evaluated by recording the real-time absorptivity of RhB at a wavelength of 553 nm.

Characterization

UV-Vis Spectrophotometer

Ultraviolet-visible (UV-vis) absorption measurements of samples in solution and in solid sate were carried out using a Cary 50 Bio spectrophotometer with a cell of 1 cm path length. Furthermore, UV-vis absorption measurements were also employed to record the photocatalytic performance for Rhodamine B degradation.

Fluorescence Spectrofluorophotometer

Horiba JobinYvonFluoroMax®-4 Spectrofluorometer was used to record fluorescence emission spectra of TCPP titration with L-/D-arginine. All experiments were performed in a quartz cell with a 1 cm path length upon excitation at 420 nm wavelength.

Scanning Electron Microscope

The supramolecular self-assembled nanostructure morphology of TCPP in presence of L-/Darginine were studied by scanning electron microscopy (SEM) using an FEIVerios 460L (operating under HV and Stage bias condition of 1 KeV, using stage bias and Circular Backscatter Detector for low conductive samples).

Transmission Electron Microscope

TEM samples were prepared and measured by paper blotting method followed by solvent evaporation on a holey carbon coated copper grid. The micrographs were investigated using a Jole 1010 100 kV transmission electron microscope.

XRD Measurements

A BrukerAXS D8 Discover instrument with a general area detector diffraction system (GADDS) using a Cu Kα source was utilized to obtain XRD patterns of TCPPnanobelts.



Fig. S1SEM images of D-arginine assisted TCPP nanobelts.



Fig. S2 SEM images of L-arginine assisted TCPP nanobelts.



Fig. S3 TEM images of TCPP nano aggregates assembled with L-arginine (A and B) and D-arginine (C and D)

References:

S1. X. Zhang, B. Zhu, L. Zhou, P. Liu and W. Deng Syn. Commun. 2015, 45, 2730-2739.