Supporting Information for

Solar Driven Hydrogen Peroxide Production Using Polymer Supported Carbon Dot as Heterogeneous Catalyst

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1 Preparation of CD Impregnated WPU

CD impregnated WPU was prepared according to the method as described elsewhere [1, 2, 3]. Briefly, isophorone diisocyanate (2.00 mol, Sigma-Aldrich, Germany), poly(ethylene glycol) with number average molecular weight 600 (0.80 mol, Merck, India), bis(hydroxyl methyl) propionic acid (0.53 mol, Sigma-Aldrich, Germany) were reacted in a four necked glass reactor equipped with a condenser, mechanical stirrer and nitrogen inlet. Reaction was carried out for 1.5 h in nitrogen atmosphere with stirring at a temperature of 85±2 °C. In the next step, 1,4-butane diol (0.54 mol, Merck, India) and tannic acid (0.07 mol, Sigma-Aldrich, Belgium) in limited amount of tetrahydrofuran (Merck, India) were added and the reaction was carried out within a close system at a temperature of 70±2 °C for 4-4.5 h. Then triethyl amine (0.53 mol, Merck, India) was added slowly at room temperature to create the ionic centers by neutralizing –COOH groups. After this step water was added at a very slow and steady rate with constant mechanical stirring. Then varying amount of CD (1-5 wt%) is incorporated to the polymer matrix by using mechanical stirring and ultra-sonication. Finally, tetrahydrofuran was removed carefully under reduced pressure. This polymeric system was cured with 20% glycerol based hyperbranched epoxy and fatty acid based poly(amido amine) using sound and heat energy [3]. Different amount of CD was used to obtain different catalyst systems using this standard preparative method.

2 UV-visible Spectra of CD and PNCs

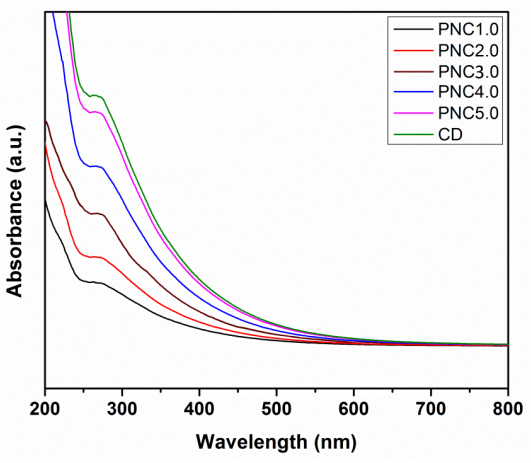

Fig. S1 UV-visible spectra of CD and PNCs

3 PL Spectra of PNCs

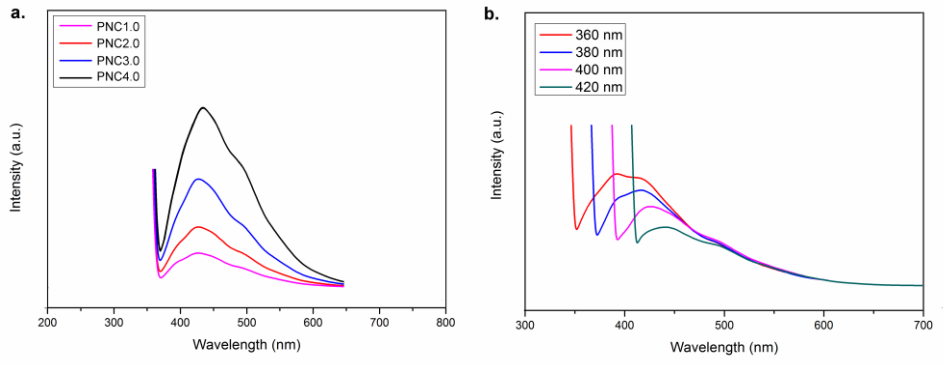

Fig. S2 a PL spectra of PNCs at excitation wavelength of 360 nm, **b** PL spectra of PNC4.0 at different excitation wavelengths

4 Rate of H_2O_2 Production

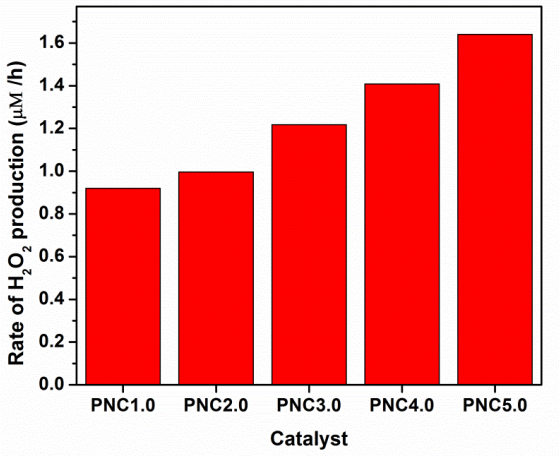

Fig. S3 Rate of H_2O_2 production by using PNC4.0 as the catalyst after a reaction of 50 h

5 Solar Driven H_2O_2 Production by Using CD as Catalyst

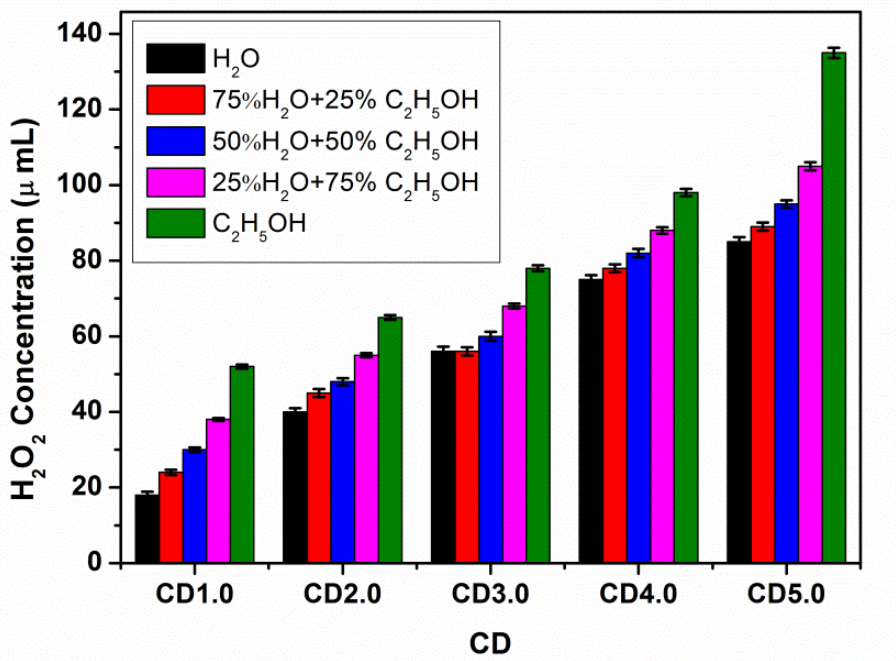

Fig. S4 Solar driven H_2O_2 production by using CD as the catalyst

6 Leaching Study of CD after 5th Cycle

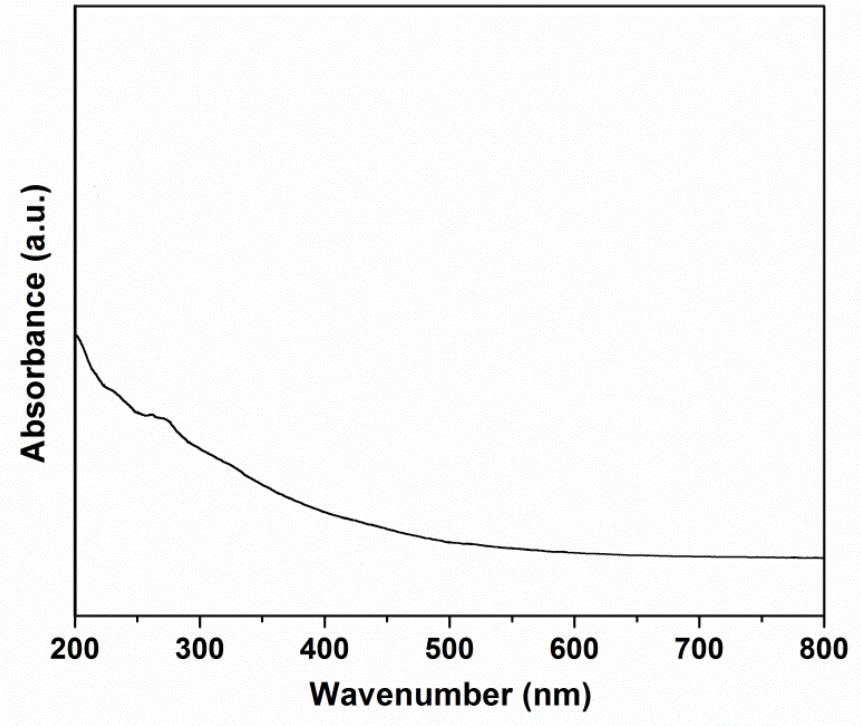

Fig. S5 UV-Visible spectrum of the reaction medium after 5th cycle

References

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[3] S. Gogoi, M. Kumar, B.B. Mandal, N. Karak, High performance luminescent thermosetting waterborne hyperbranched polyurethane/carbon quantum dot nanocomposite with invitro cytocompatibility. Comp. Sci. Technol. **118**, 39-46 (2015). doi:10.1016/j.compscitech.2015.08.010