

Electronic Supplementary Information

Broadening the Sunlight Response Region with Carbon Dot Sensitized TiO₂ as Support for Pt Catalyst in Methanol Oxidation Reaction

Anindita Bora, Kiranjyoti Mohan, Simanta Doley, Prayashi Goswami and Swapan Kumar Dolui*

Department of Chemical Sciences, Tezpur University, Napaam, Assam, 784028, India

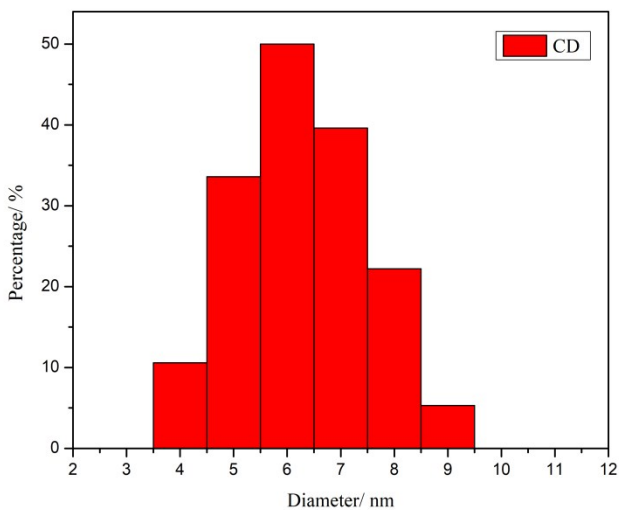


Fig. S1 Particle size histogram of CDs.

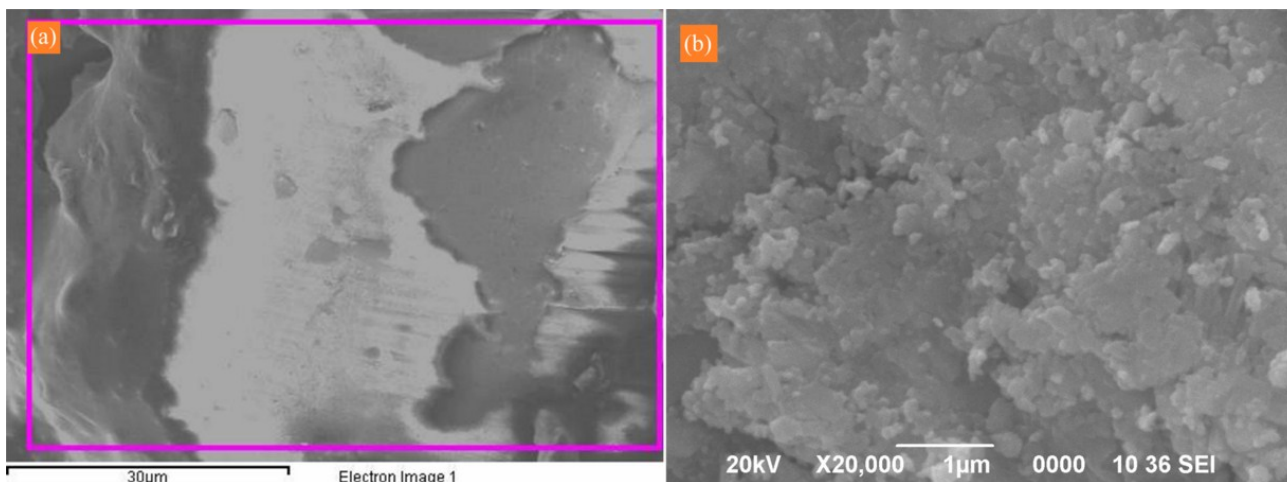


Fig. S2 SEM images of Pt₃/CD₂/TiO₂: (a) the section used for EDX mapping and (b) a magnified image.

Quantum Yield Calculations

The quantum yield of carbon dots (Φ_{CD}) was calculated by comparing their photoluminescence intensities ($\lambda_{ex} = 340$ nm) and the absorbance values (at 340 nm) with reference to quinine sulphate (QS). Five concentrations of each of CDs and QS were prepared by dissolving them in distilled water (refractive index (η) = 1.33) and 0.1 M H_2SO_4 ($\eta = 1.33$) respectively. The absorbance of all the samples was kept less than 0.1 at 340 nm. The quantum yield of QS (Φ_{QS}) reported in literature is 0.54. The data of integrated PL intensity vs. absorbance was plotted (**Fig. S3**) to determine the slopes of CDs (m_{CD}) and QS (m_{QS}). The value of Φ_{CD} was then calculated in accordance to the following equation:

$$\Phi_{CD} = \Phi_{QS} (m_{CD} / m_{QS}) (\eta_{CD}^2 / \eta_{QS}^2)$$

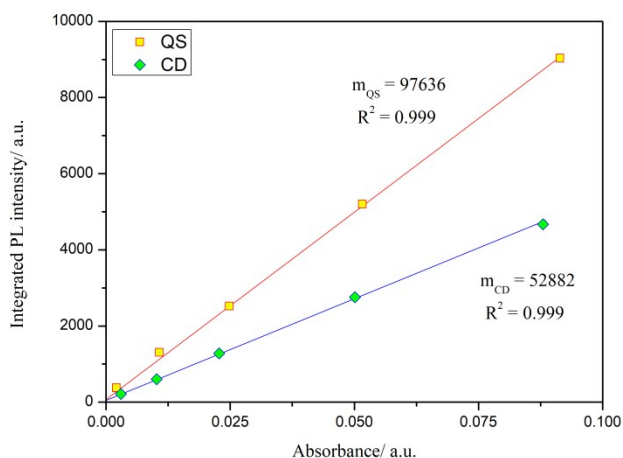


Fig. S3 Photoluminescence vs. absorbance plots of CD and QS.

The quantum yield of CD is found to be 29%

Table S1. EIS parameters of the Pt_y/CD₂/TiO₂ composites recorded under light and dark conditions.

Composite	R_s / Ω	R_{CT} / Ω	R_s / Ω	R_{CT} / Ω
	(Light)		(Dark)	
Pt2.5/CD2/TiO₂	15.06	24.44	15.71	28.13
Pt3/CD2/TiO₂	12.15	17.29	12.73	21.48
Pt3.5/CD2/TiO₂	12.98	19.26	13.48	23.63
Pt4/CD2/TiO₂	13.77	22.01	14.34	25.92