

Supporting Information

Fabrication of Dual Catalytic Microcapsules by Mesoporous Graphitic Carbon Nitride (mpg-C₃N₄) Nanoparticles-Enzyme Conjugates Stabilized Emulsions.

Rohit Varshney^a, Sushil Kumar^b, Kaushik Ghosh^{b} and Debabrata Patra^{a*}*

^aInstitute of Nano Science and Technology, Habitat Centre, Phase-10, Sector-64, Mohali, Punjab, 160062, India

^bInstitute of Nano Science and Technology, Habitat Centre, Phase-10, Sector-64, Mohali, Punjab, 160062, India

The N₂ adsorption- desorption isotherms of the mesoporous graphitic carbon nitride have been conducted to estimate the specific surface area, and pore size distribution. The analysis shows that the mpg-C₃N₄ high specific surface area (110 m²/g) as compared to the bulk-gC₃N₄ (20 m²/g).

The Average crystallite size is calculated by the Scherrer equation

$$D = (K \times \lambda) / (\beta \cos \theta).$$

Where, D is the mean size of the ordered (crystalline) domains at particular angle, K is a dimensionless shape factor (0.9), λ is the X-ray wavelength, β is the line broadening at Full Width at Half Maxima (FWHM) and θ is the Bragg angle. Using this equation, and the average of all the D values has been calculated to be 4.9 nm.

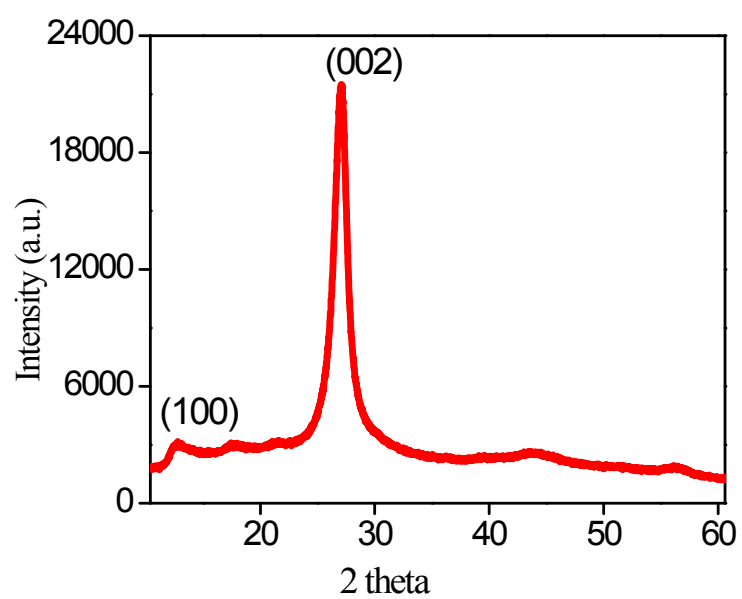


Figure S1: Powder XRD pattern of mpg-C₃N₄ NPs

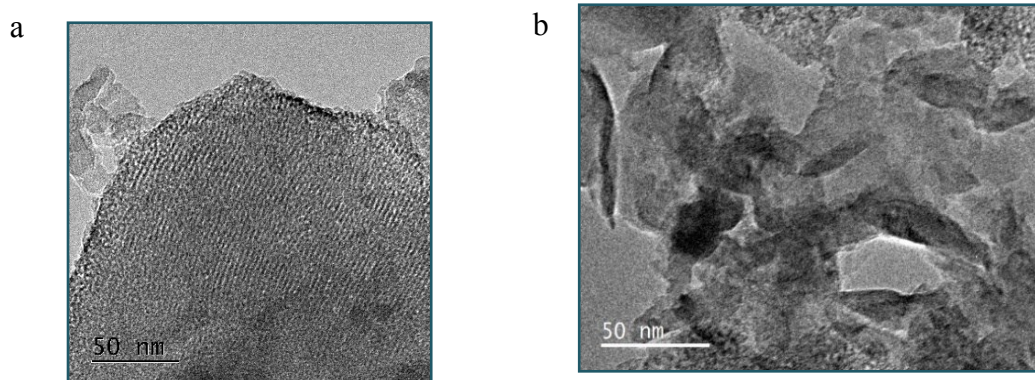


Figure S2: TEM images of (a) MCM 41 (b) freshly prepared mpg-C₃N₄ NPs

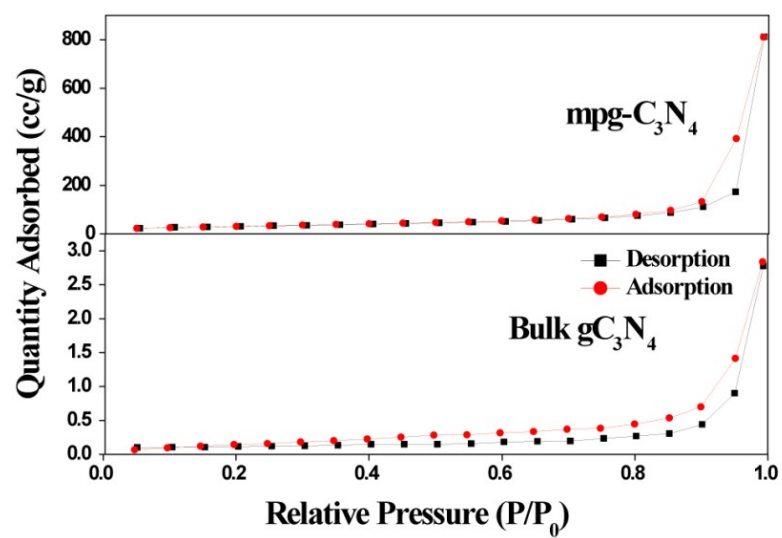


Figure S3 : BET studies of mpg- C_3N_4 and bulk gC_3N_4

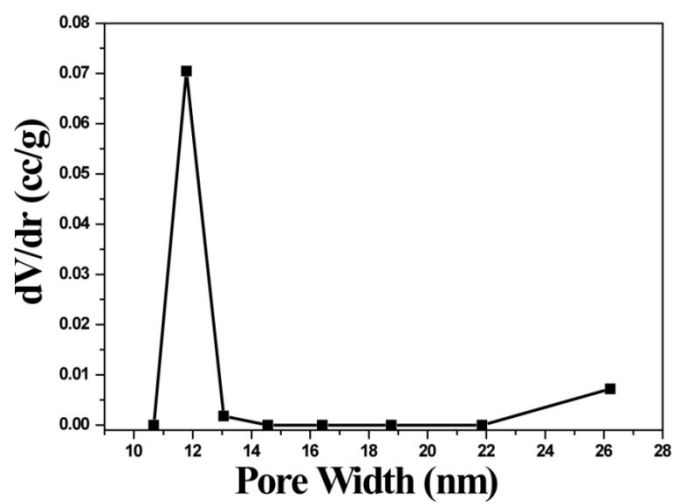


Figure S4: mpg- C_3N_4 pore size distribution

B. Zeta Potential Titration

Stock Solution:- mpg-C₃N₄ NPs = 1mg/mL; Lipase: 1 mg/mL.

Total Volume for titration: 800 μ L.

Titration with varying volume ratio of mpg-C₃N₄ and lipase

Volume ratio	Zeta Potential (mV)
1:1.5	-8.21 $\pm$ 0.56
1:1	-3.27 $\pm$ 0.375
1:0.7	-0.556$\pm$0.16
1:0.6	3.79 $\pm$ 0.42
1:0.5	3.95 $\pm$ 0.366

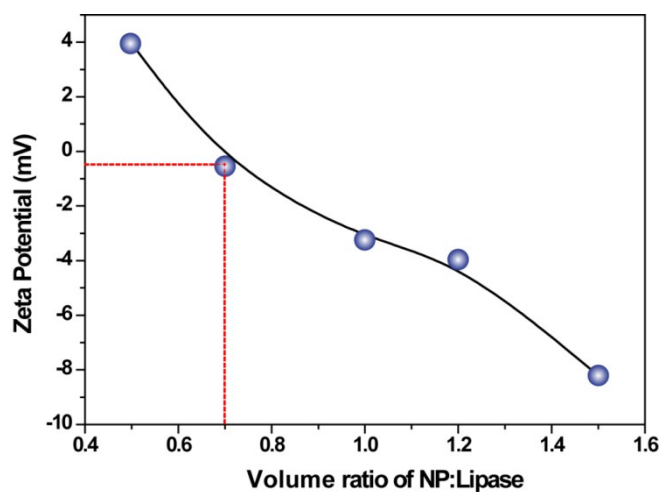


Figure S5: Zeta potential values of NP: Enzyme complexes formed at varied mole ratio of NP with enzyme.

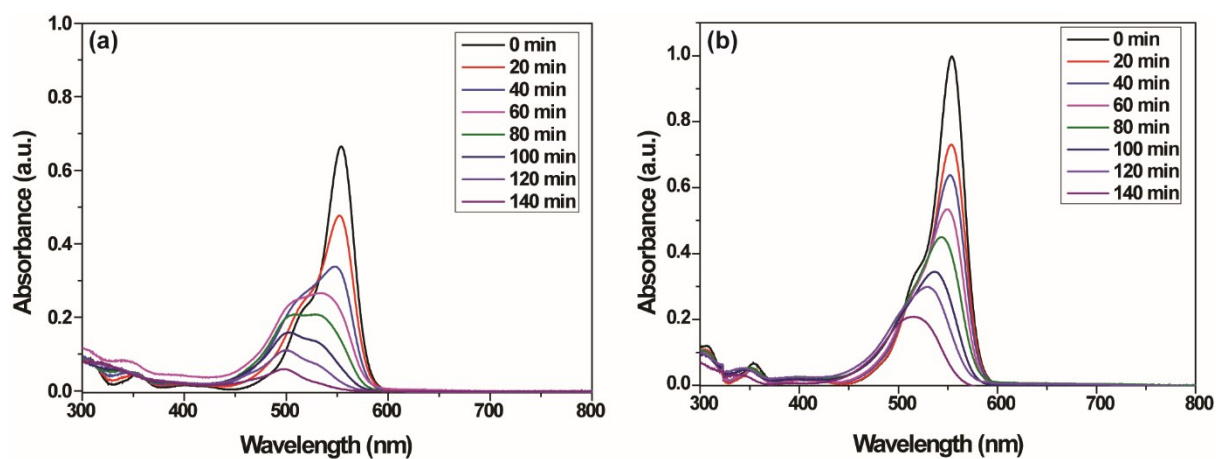


Figure S6: Absorption spectra of RhB with irradiation time over (a) mpg-C₃N₄MCs and (b) dispersed solution of mpg-C₃N₄.

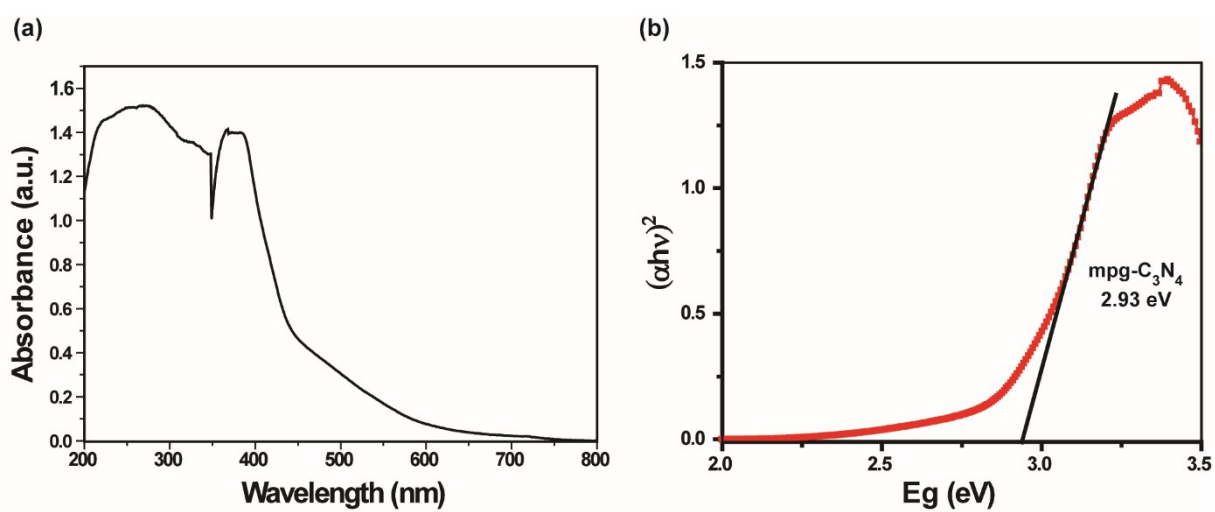


Figure S7: (a) UV-Vis diffuse reflectance Plot (b) $(\alpha h\nu)^2$ vs photon energy (E_g) plot for the band gap determination of mpg-C₃N₄