Electronic Supplementary Information

(ESI)

From graphite oxide to highly water dispersible functionalized graphene by single step plant extract-induced deoxygenation

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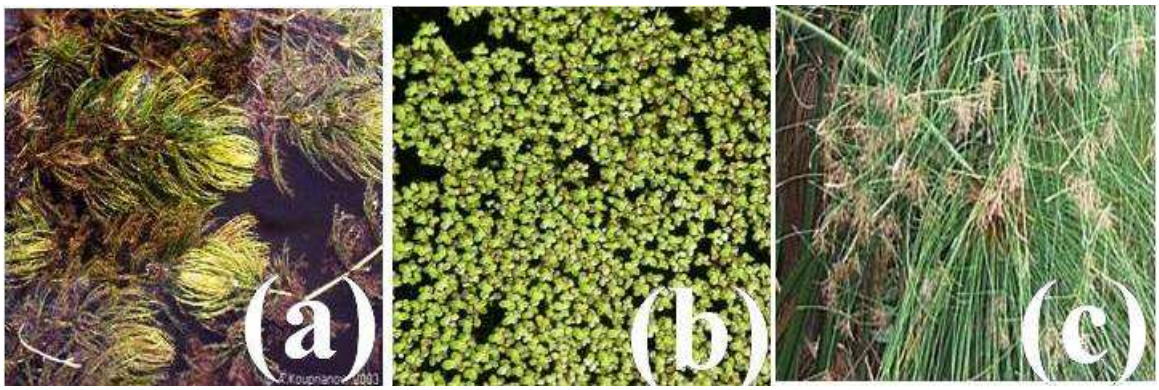

Fig. S-1 Digital images of (a) *Ceratophyllum demersum* L (Cer-plant), (b*) Lemna Gibba* (Le-plant) (c) *Cyperus difformis* (Cy-plant).

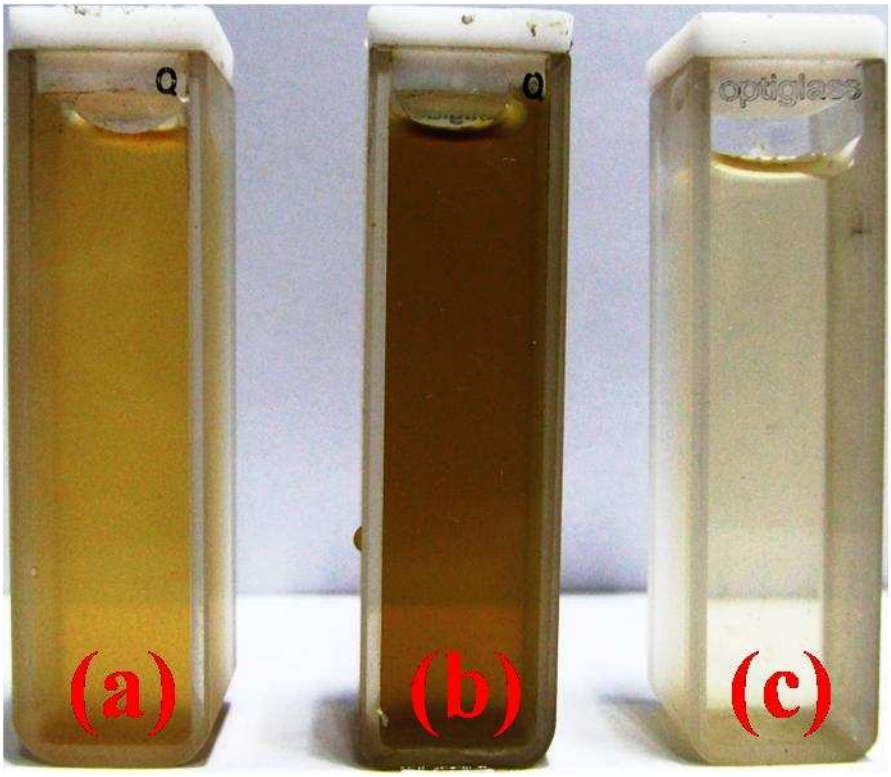

Fig. S-2 Digital images of aqueous extracts of (a) Cer-plant, (b) Le-plant, (c) Cy-plant used for de-oxygenation of graphite Oxide (GO).

Fig. S-3 shows XRD data of GO, Cer-PCGN, Le-PCGN and Cy –PCGN. The Plant extract induced de-oxygenation of GO makes the peak at 2θ = 10.8º disappear indicating complete reduction of GO to Cer-PCGN (b), Le-PCGN (c) and Cy –PCGN (d).

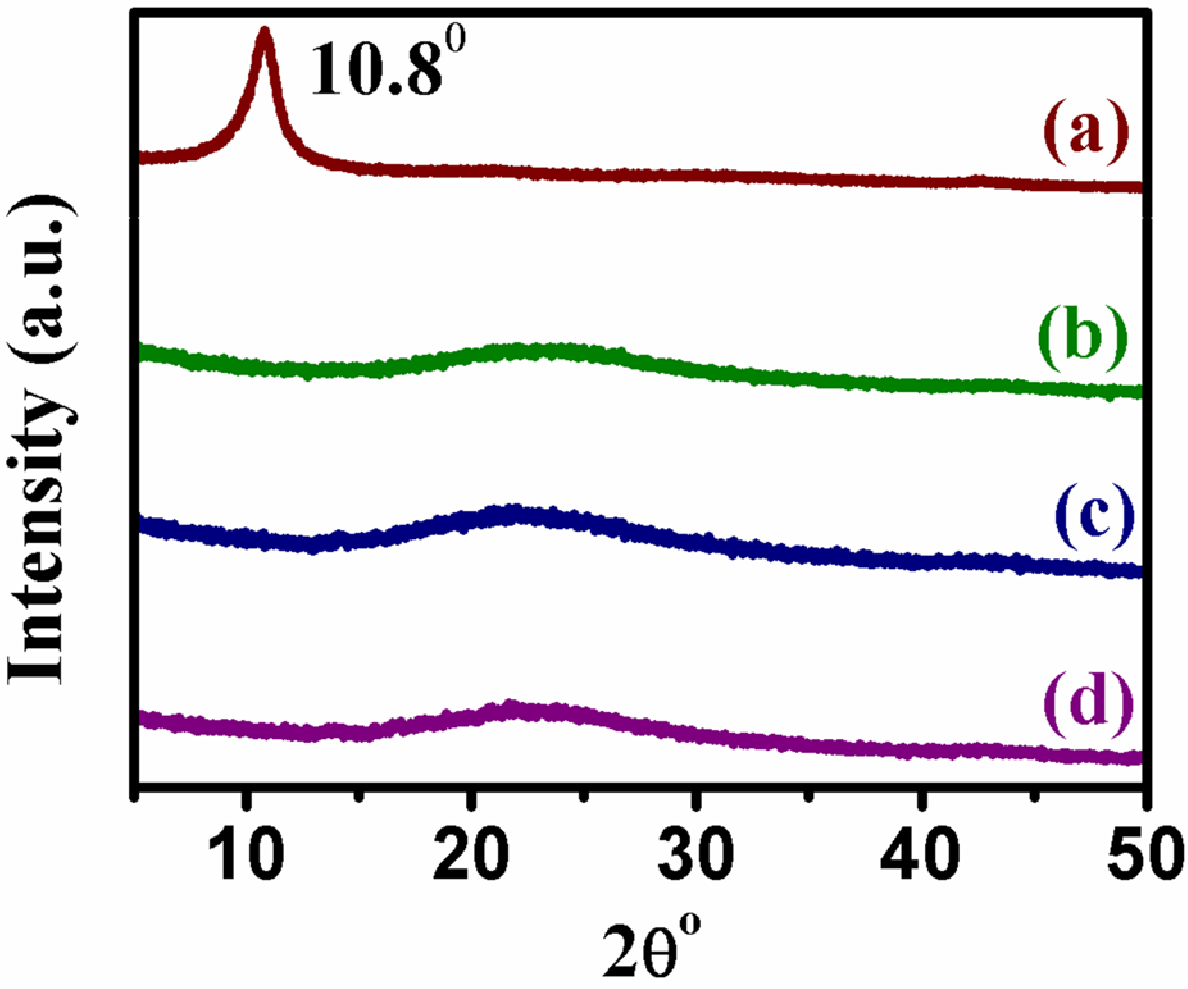

Fig. S-3 XRD data of (a) GO (b) Cer-PCGN (c) Le-PCGN (d) Cy- PCGN.

Fig. S-4 shows UV-Visible spectra of Cer-PCGN (a), Le-PCGN (b) and Cy –PCGN (c) samples. The absorption peak at 270 nm corresponds to $\pi \rightarrow \pi^*$ transition of extended conjugation of the C=C bonds.

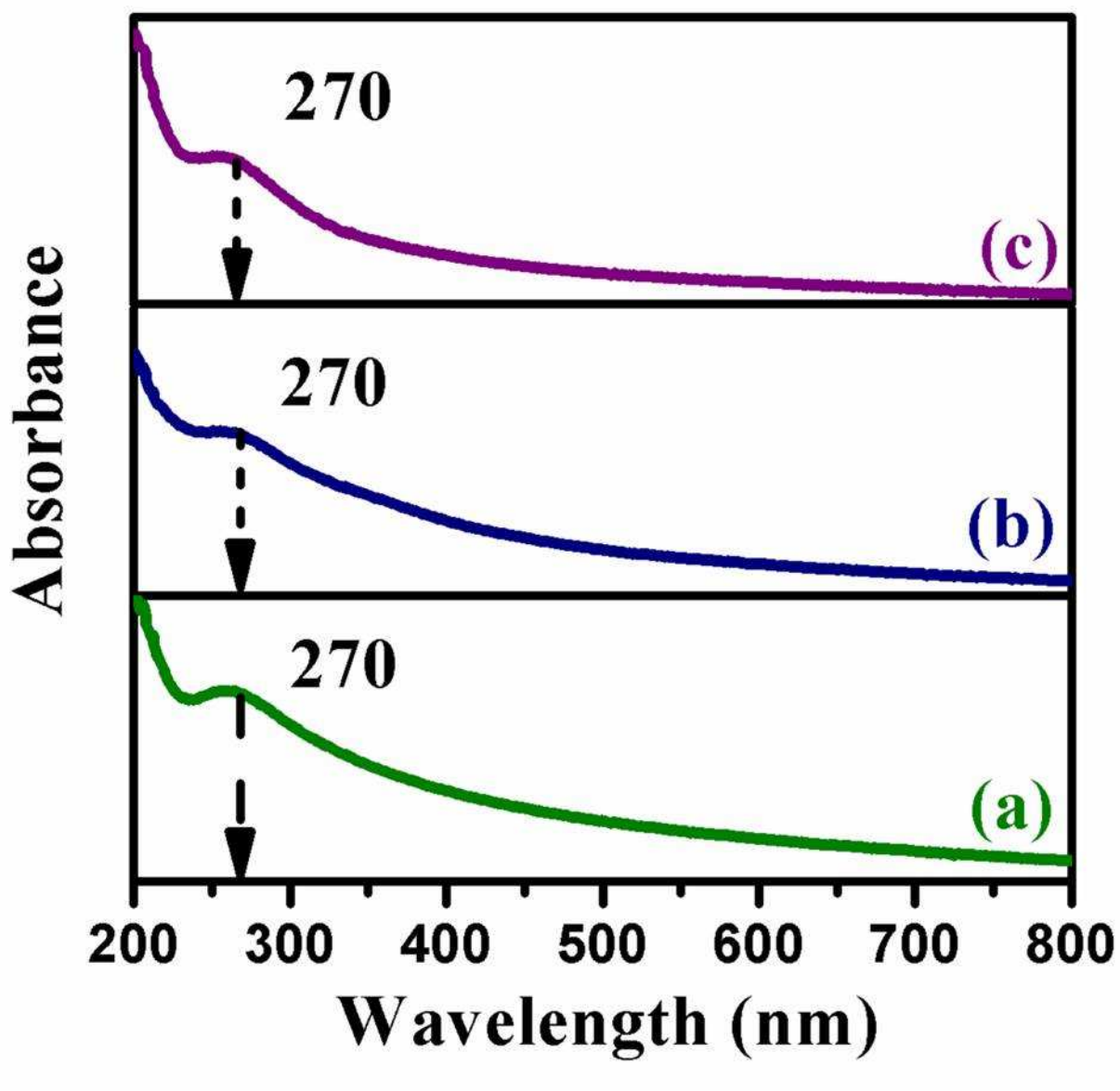

Fig. S-4 UV-Visible plot of (a) Cer-PCGN (b) Le-PCGN (c) Cy- PCGN.

Fig. S-5 shows Raman spectra of graphite (a), Cer-PCGN (b), Le-PCGN (c) and Cy – PCGN (d). Compared to the graphite case, in each case of PCGN samples intensity of D band is higher indicating decrease in the average size of sp^2 domain. G band of PCGN samples is broadened with blue shift in Raman frequency.

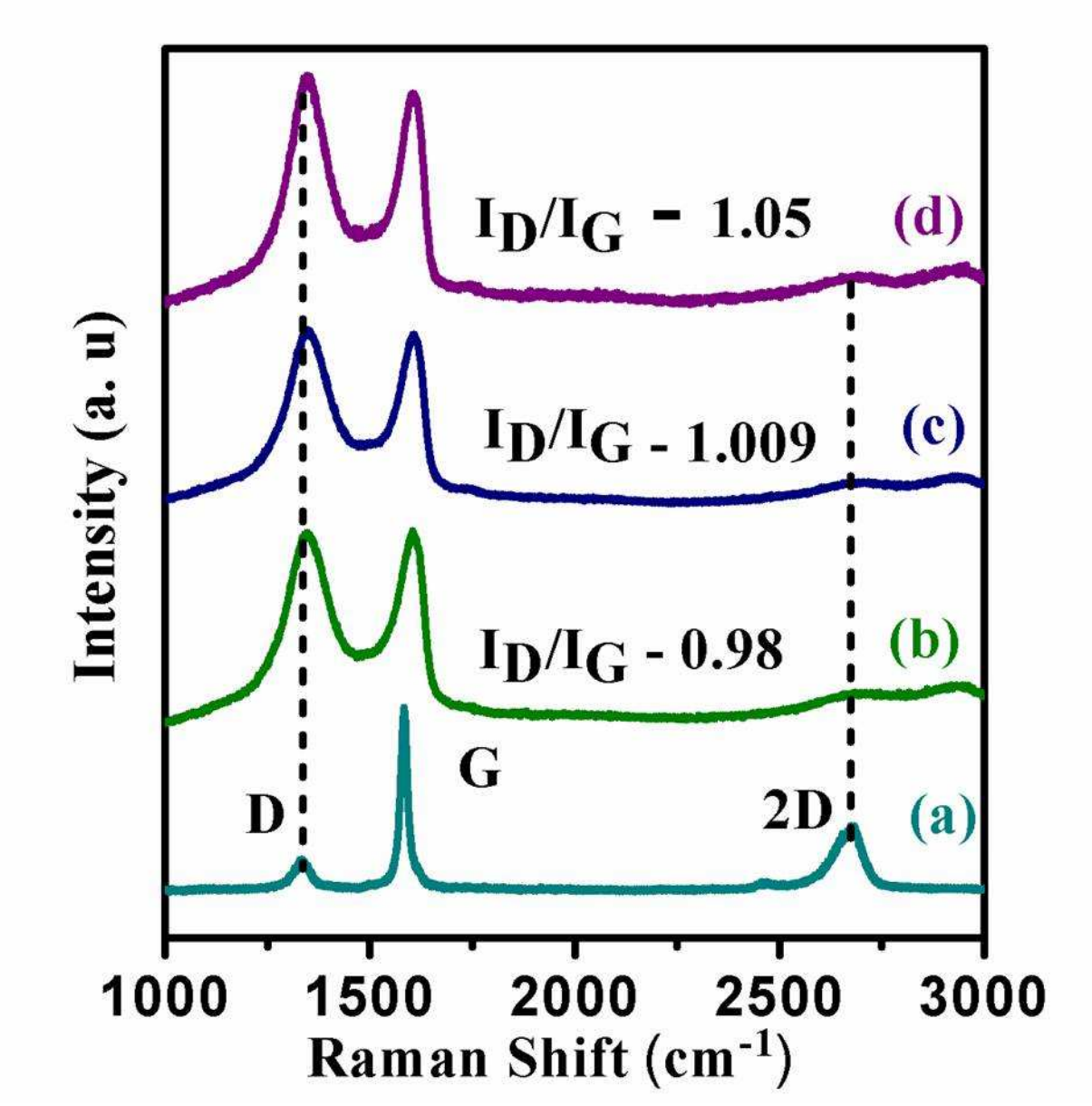

Fig. S-5 Raman spectra of (a) Graphite, (b) Cer-PCGN, (c) Le-PCGN (d) Cy- PCGN.

Fig. S-6 shows ATR-FTIR spectra of GO (a), Cer-PCGN (b), Le-PCGN (c) and Cy –PCGN (d). A new absorption band appearing at ~1550 cm^{-1} in PCGN cases (Fig. S-6 b to d) may be due to skeletal vibrations of graphene sheets. The intensity of oxygen containing functionalities is considerably reduced.

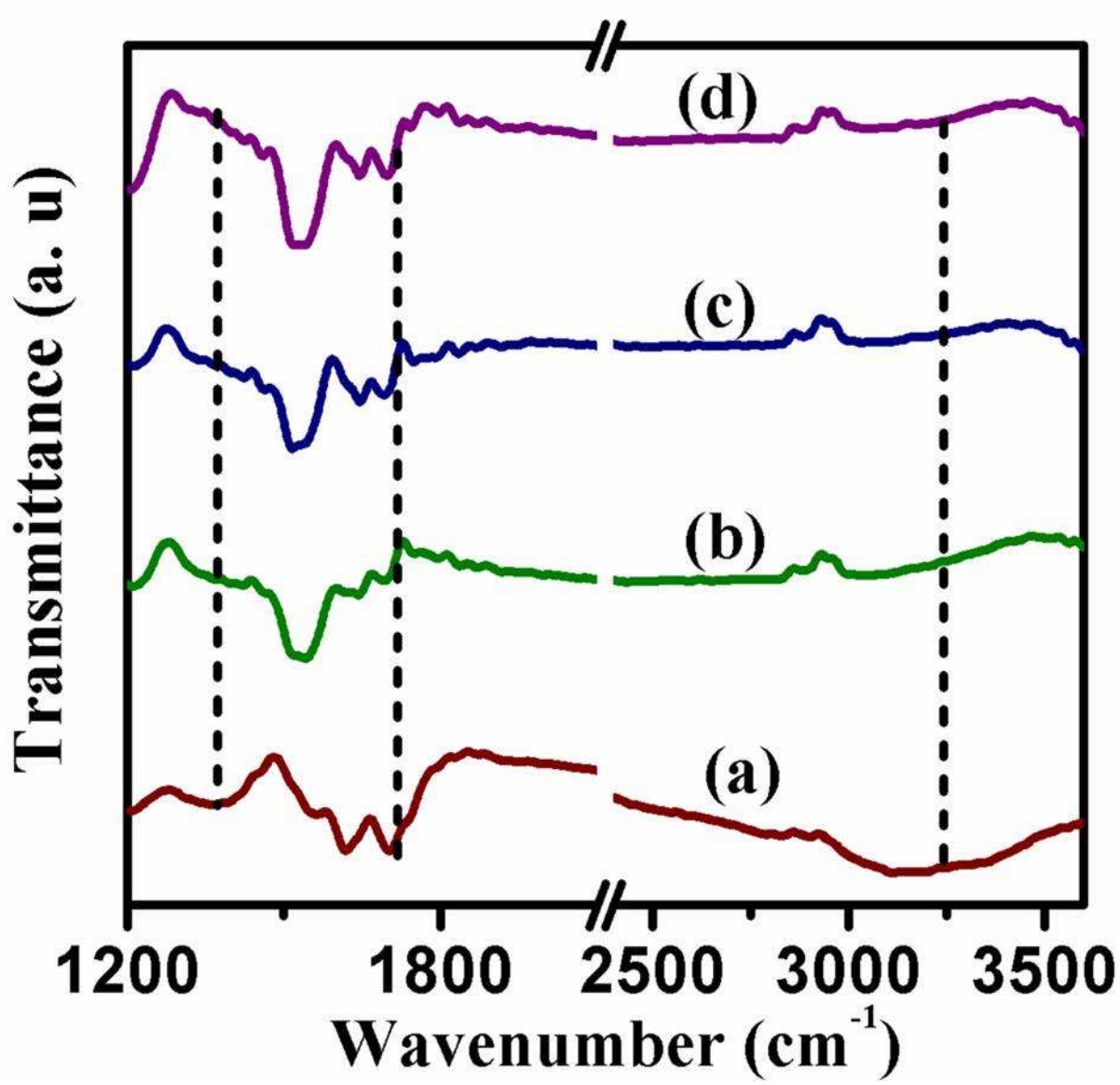

Fig. S-6 ATR-FTIR spectra of (a) GO, (b) Cer-PCGN, (c) Le-PCGN (d) Cy- PCGN.

Fig. S-7 shows the TEM images for the Cer-PCGN (a), Le-PCGN (b) and Cy-PCGN (c) samples. The image clearly shows ultrathin sheet like morphology.

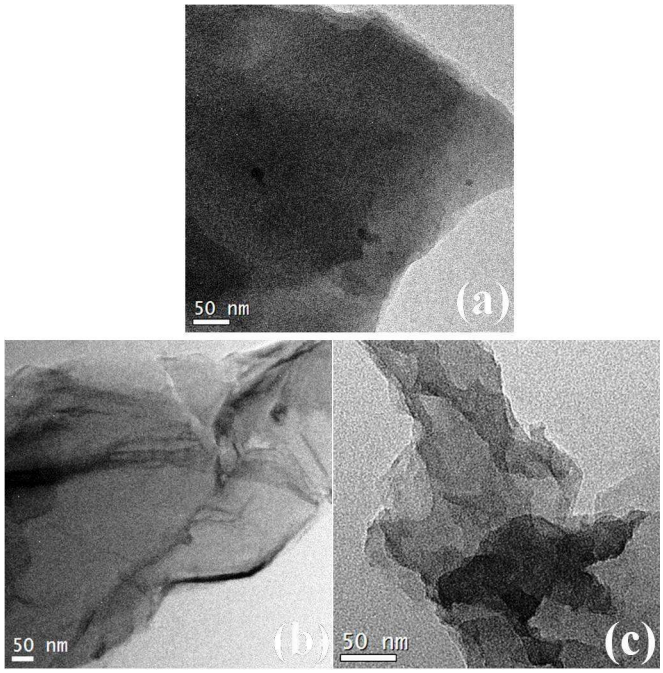

Fig. S-7 TEM images of (a) Cer-PCGN (b) Le-PCGN (c) Cy-PCGN.

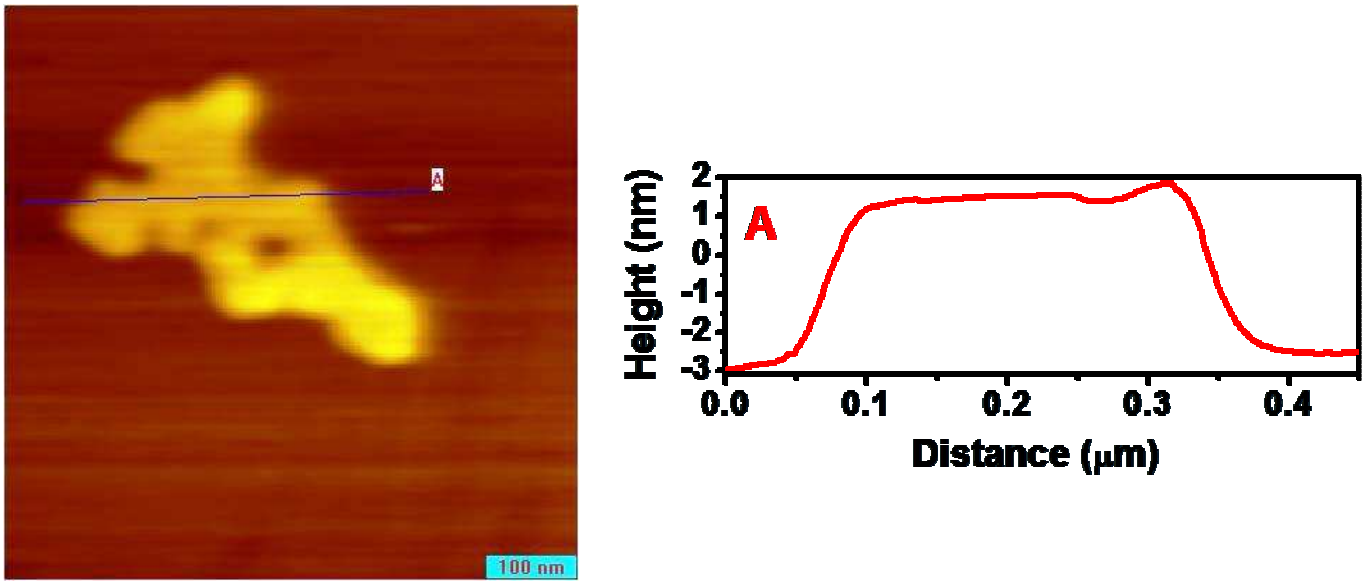

Fig. S-8 AFM image of Po-PCGN and its height profile shown in section (A)

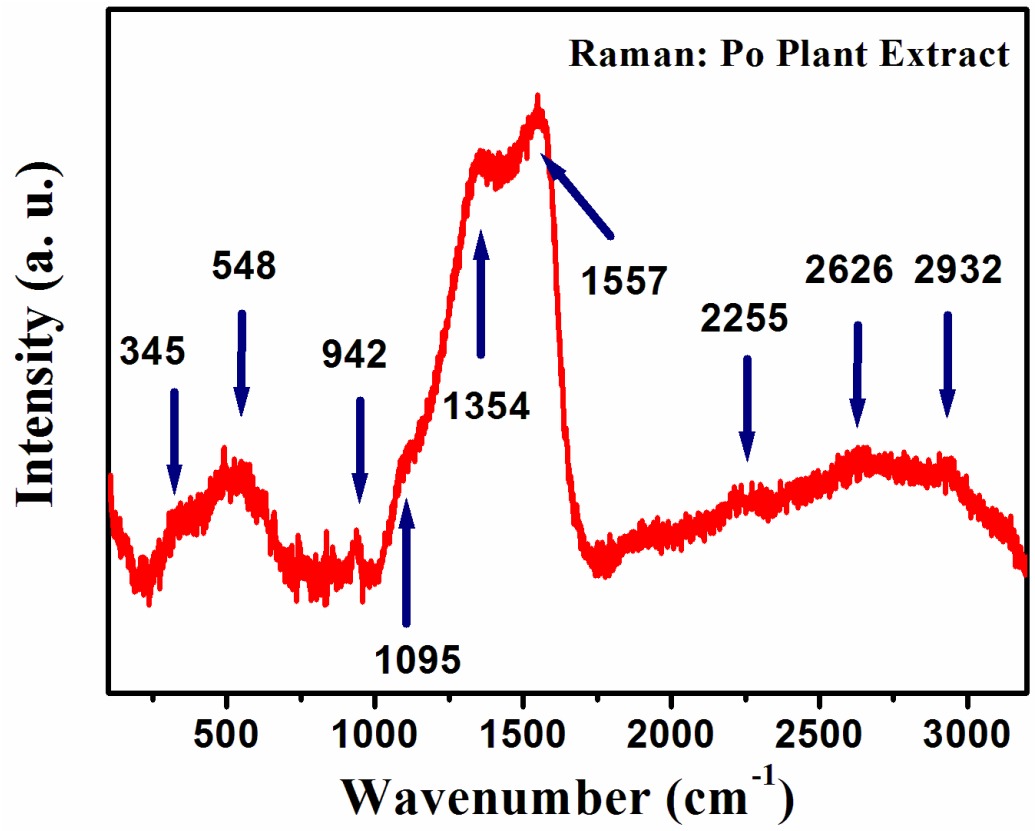

Fig. S-9 Raman spectra of Po plant extract

Cell culture and cytotoxicity of GO, CCG and Po-PCGN: The Fibroblast cell line NIH-3T3 was procured from National Centre for Cell Science, Pune India. It was maintained in Dulbecco's modified eagle's medium (DMEM) supplemented with 1.5 gm/L sodium bicarbonate, 4mM L-glutamine, 1mM sodium pyruvate and 10% heat inactivated fetal calf serum (Gibco-Invitrogen, Carlsbad, CA). The cells were cultured in a humidified atmosphere at 37°C in 5% CO_2. Cytotoxicity of GO, Po-PCGN and CCG were assessed by MTT (3- (4, 5-Dimethylthiazol-2-yl) -2, 5-diphenyltetrazolium bromide) assay. Cells were seeded at a density of (1 x 10^4/ well) in a 96 well tissue culture plate (Falcon, USA) and treated with different concentrations of nanoparticles. After 24h incubation time MTT 10 ul (5mg/ml in PBS) /well was added and incubated for 4h at 37°C in 5%CO_2. The supernatant was then removed, and cells were lysed with 100 µL of dimethylsulfoxide. Optical absorbance was measured at 570 nm by a microplate reader (molecular devices). The reading in untreated cells was considered as 100% viability.

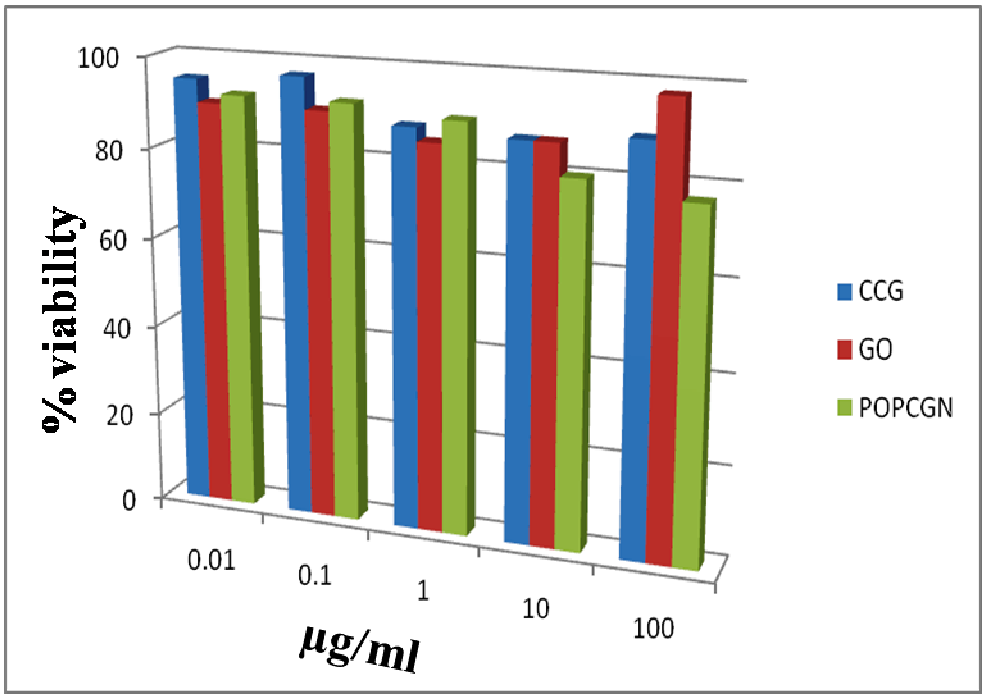

Fig. S-10 Cytotoxicity of GO, CCG and Po-PCGN.