

Supporting Information

Extraction of Preformed Graphene Oxide from Coal: Its Clenched Fist Form Entrapping Large Molecules

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FT-IR spectra:

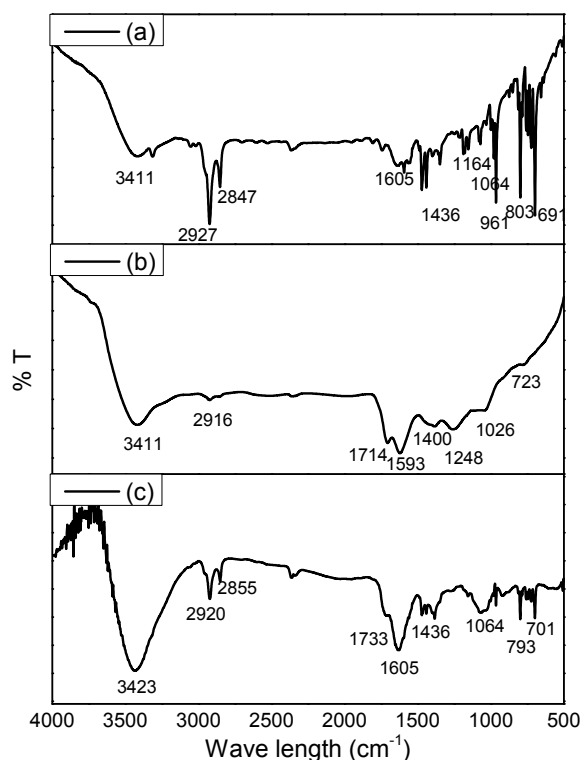


Figure S1: FT-IR spectra

(a) FT-IR of TPP (b) FT-IR of GO, (c) FT-IR of GO-TPP

Powder X-ray diffraction (XRD) :

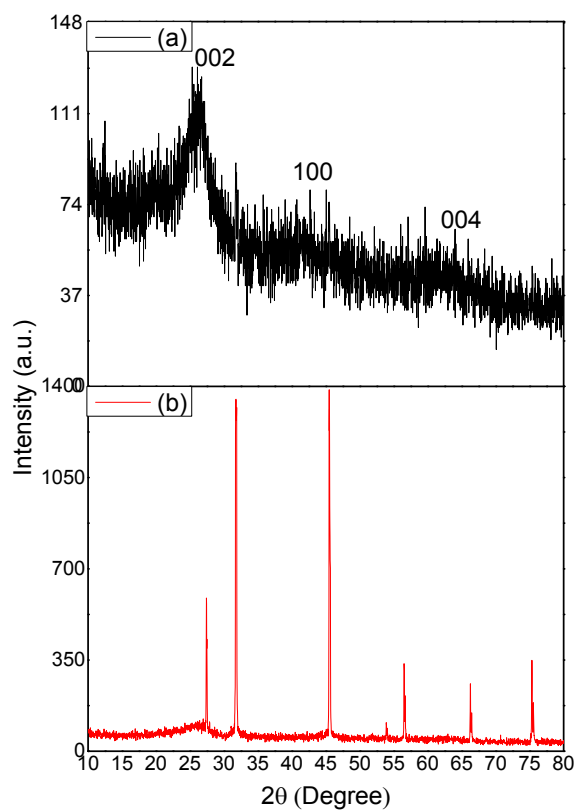


Figure S2: XRD pattern

(i) (a) XRD of GO, (b) XRD of GO-TPP

From XRD, it shows incorporation of TPP occurred in GO as sharp peak arises along with broad peaks of GO.

(002) plane 2θ value which was at 25.92° is now shifted to 26.67° due to stacking of TPP inside in the GO. Similarly (100) and (004) planes are shifted from 42.38° to 42.03° and from 62.91° to 63.68° respectively.

Electronic spectra:

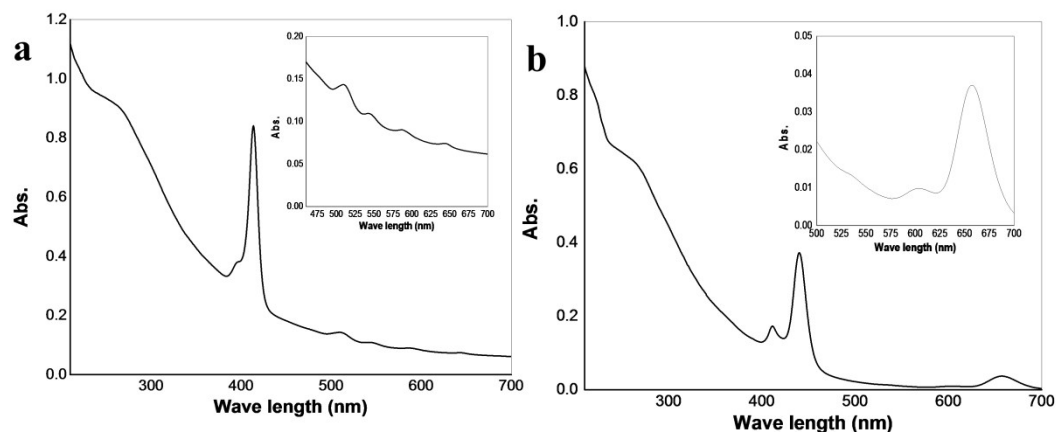


Figure S3: Electronic spectra: (a) GO-TPP in ethanol, inset: Q bands (b) addition of HCl on (a) inset: Q bands

Fluorescence Spectra:

Ethanol as solvent:

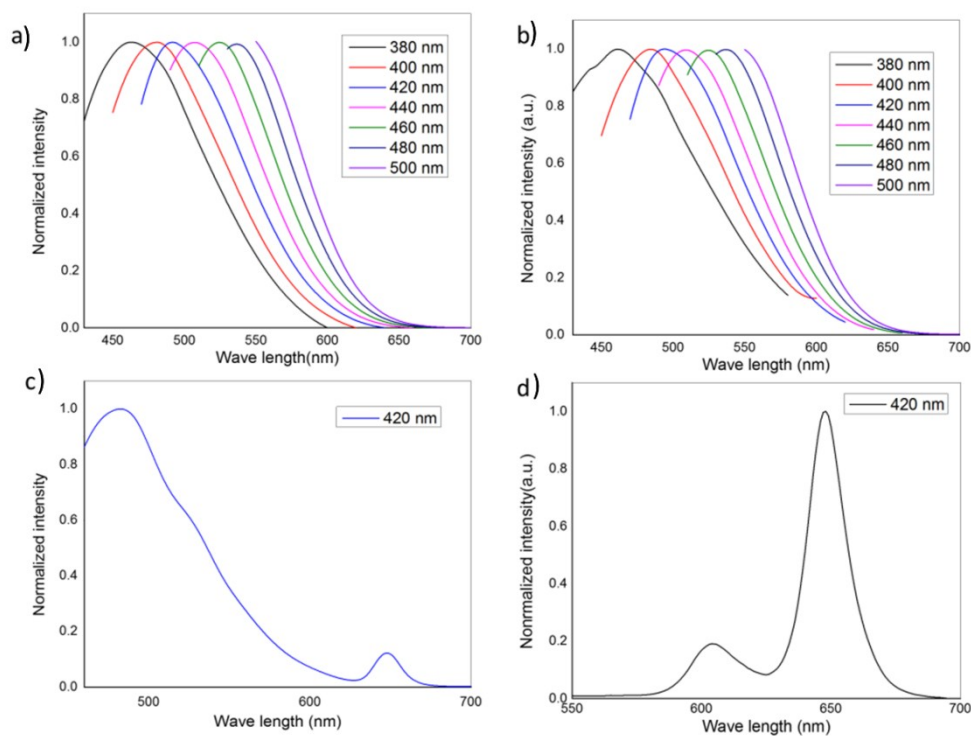


Figure S4: Fluorescence emission spectra (a) Open GO, (b) Close GO, (c) GO-TPP and (d) TPP

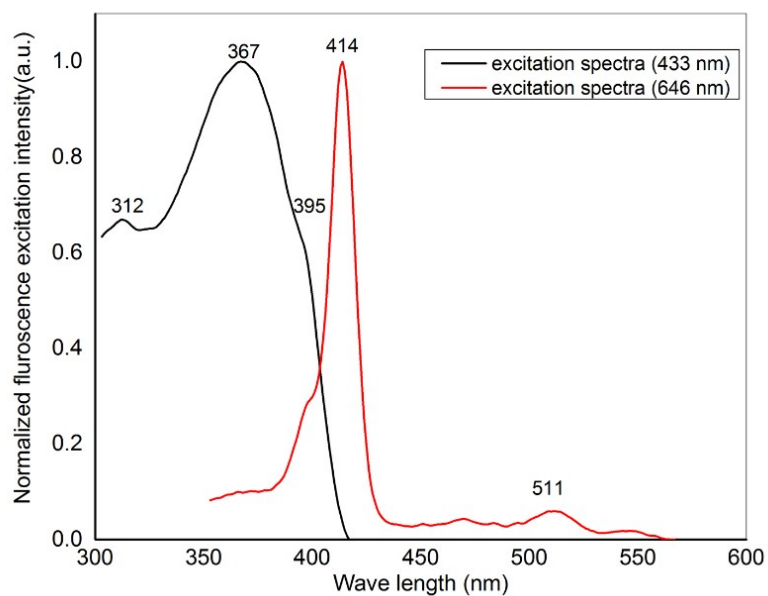
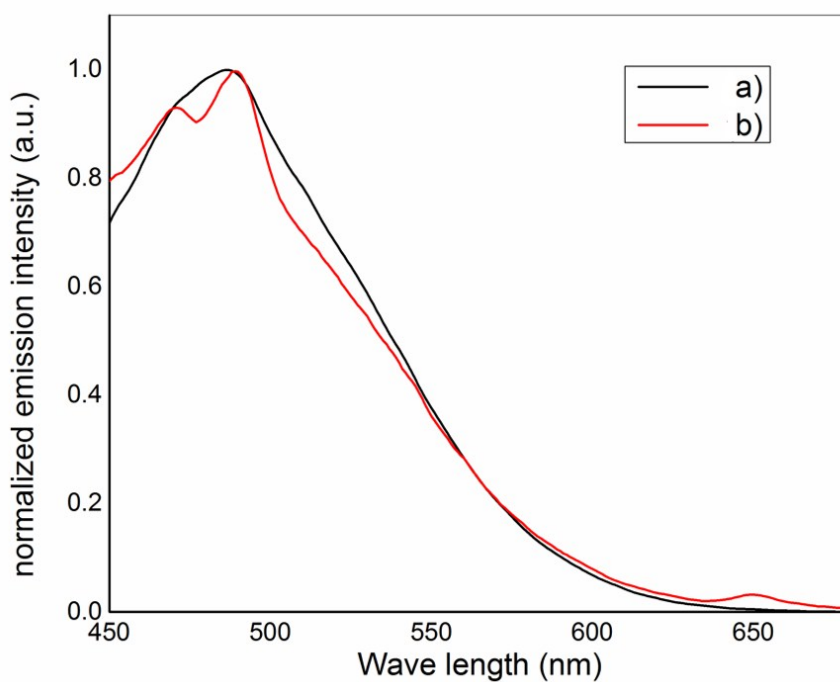


Figure S5: Fluorescence excitation spectra GO-TPP. Showing the presence of GO and TPP together.

Phosphate buffered saline (PBS) buffer as solvent:



SI-Figure 6: (a) Fluorescence emission spectra in PBS buffer 7.4 of GO-TPP and (b) Fluorescence emission spectra in PBS buffer 6.8 of GO-TPP excited at 420 nm.

Size distribution from AFM picture

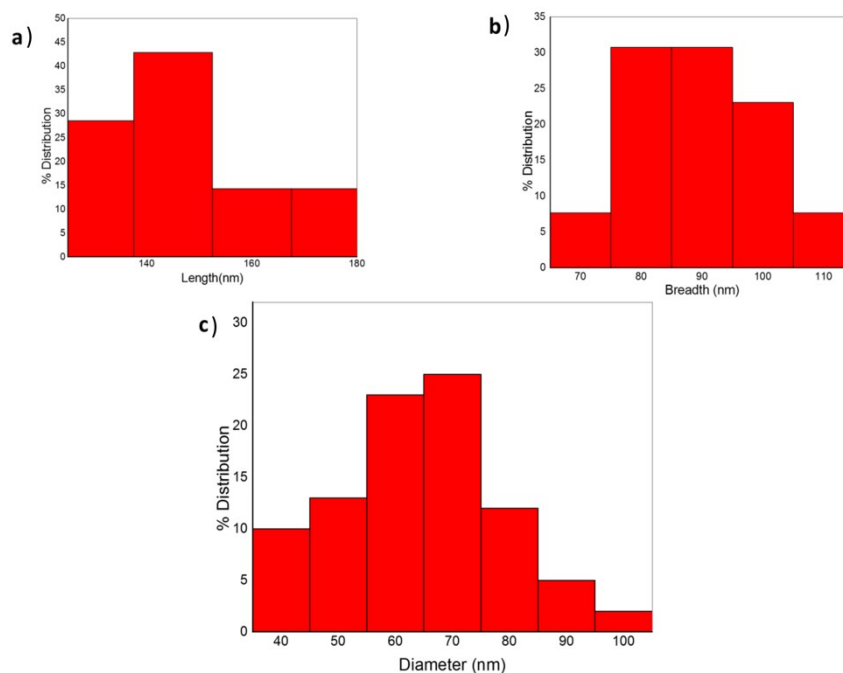


Figure S7: Size distribution from AFM image (fig.3 of main text)

- (a) Length distribution of fig. 3a (open GO),
- (b) Breadth distribution of fig. 3a (open GO),
- (c) Size(diameter) distribution of fig. 3b (close GO),

open GO			number of unit requires to form close GO(spherical)	
			1	2
Length (nm)	Breadth (nm)	Area (nm ²)	Size of close GO(diameter in nm)	
151.741	96.599	14658.03	70	100
131.06	79.598	10432.11	60	80
151.702	93.153	14131.5	70	100
182.764	110.328	20163.99	80	120
144.847	100.223	14517	70	100
151.741	103.433	15695.03	70	100
172.423	113.776	19617.6	80	110
106.881	93.153	9956.286	55	80
151.702	93.09	14121.94	70	100
120.672	89.708	10825.24	60	80
144.847	106.936	15489.36	70	100
104.348	82.746	8634.38	50	70
77.785	72.403	5631.867	40	60

GO-TPP was dissolved in PBS buffer at 7.4 and 6.8 separately, HPLC grade DCM was added in these solutions, shaken and the DCM extracts were separately subjected to electronic spectroscopy. In the case of pH 7.4, a light pink colour solution appeared showing the release of TPP (confirmed by electronic spectroscopy showing the signature peaks of TPP) but at pH 6.8 no such colouration was observed.

Drug loading and deloading :

Donepezil (DZ) an acetylcholinesterase inhibitor, used for the treatment of mild-moderately Alzheimer's disease is (\pm) -2, 3-dihydro-5, 6-dimethoxy-2-[[1-(phenylmethyl)-4-piperidinyl]methyl]-1H-inden-1-one hydrochloride. It is a white crystalline powder and is freely soluble in water and chloroform, DCM.

5 mg freshly prepared GO was dissolved in 5 ml ethanol and 2 mg DZ dissolved in 6 ml water was added into it and the mixture was allowed to stand for an hour at room temperature and then evaporated at -35°C under vacuum. The dried mass was washed with cold water twice to remove any free washable DZ.

The GO-DZ composite was dissolved in ethanol and electronic spectra were recorded to show absorption spectrum similar to GO with the appearance of an additional peak at 229 nm.

The GO-DZ composite was dissolved in PBS buffer at pH 6.8 and 7.4 separately and the electronic spectra were recorded. HPLC grade DCM was then mixed with these solutions separately. The DCM extracts were subjected to electronic spectroscopy to observe the electronic spectral signature of DZ only in PBS buffer 7.4. (PBS buffer strength: 0.01M) and the DCM extract at pH 6.8 remained blank.