Electronic Supplementary Material

Sucrose-Mediated Mechanical Exfoliation of Graphite: A Green Method for the Large Scale Production of Graphene and its application in Catalytic Reduction of 4 - Nitrophenol

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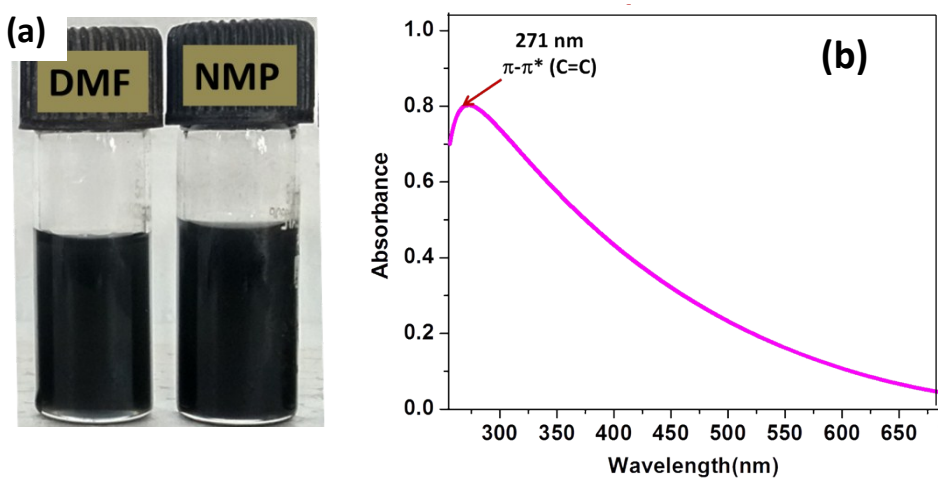

Figure S1: (a) Stable dispersions of graphene in DMF and NMP after kept for 1 month and (b) UV-Visible spectra of graphene dispersion in DMF obtained after 15 minute sonication and centrifugation for 15 minute at 1000 rpm.

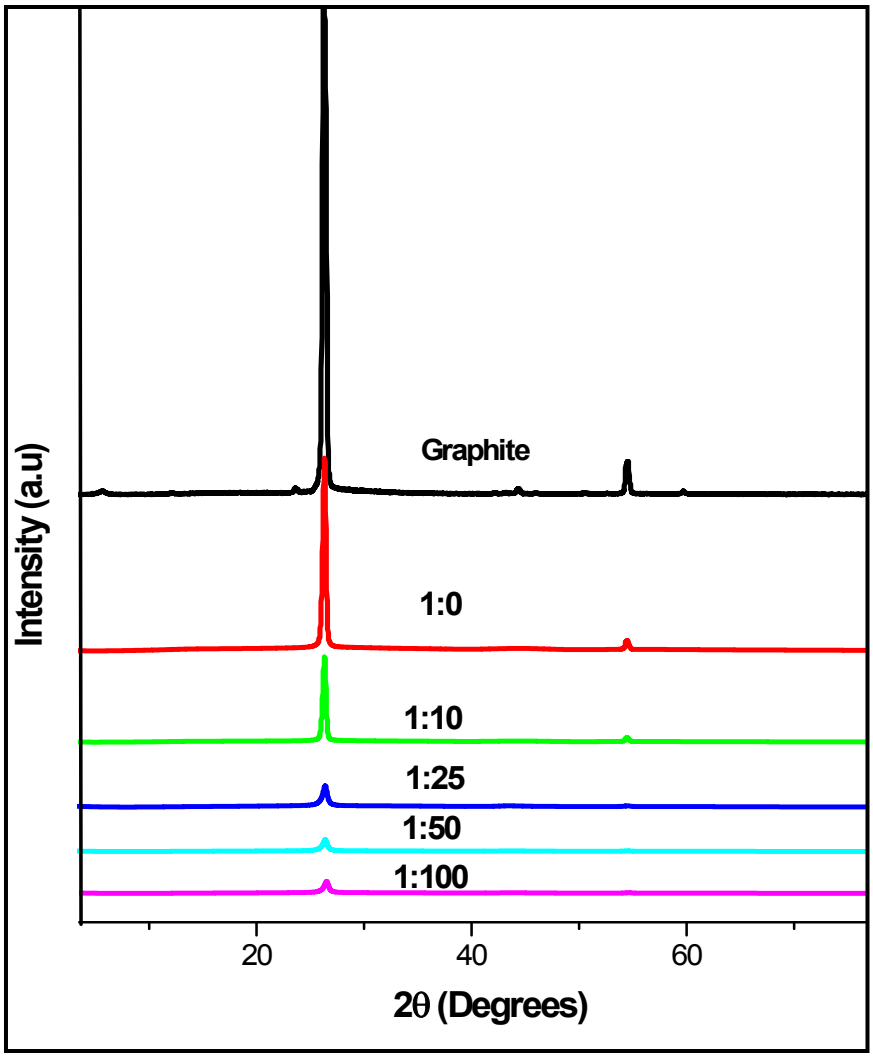

Figure S2: XRD pattern of graphene obtained using varied graphite/sucrose weight ratios

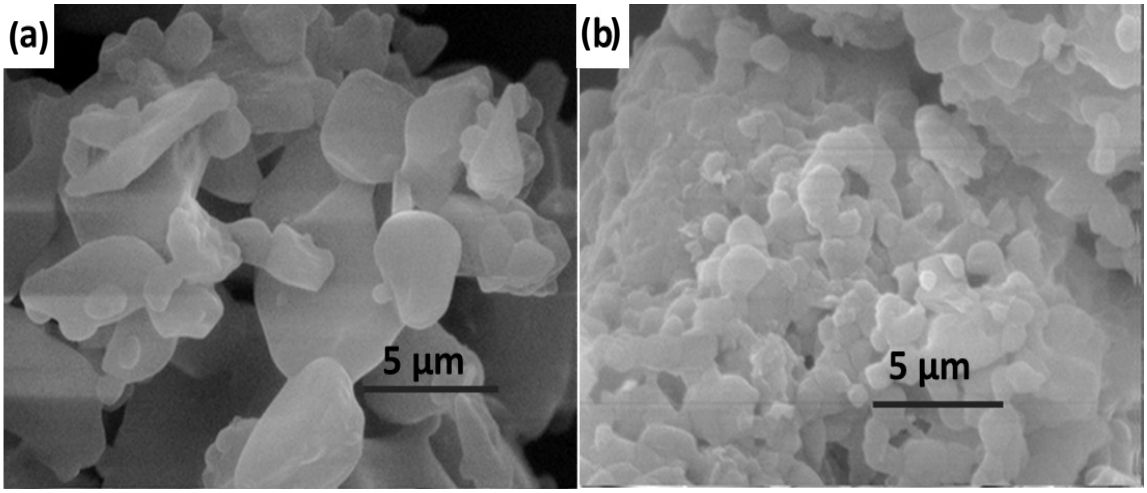

Figure S3. SEM images of (a) Ball-milled Sucrose and (b) GB

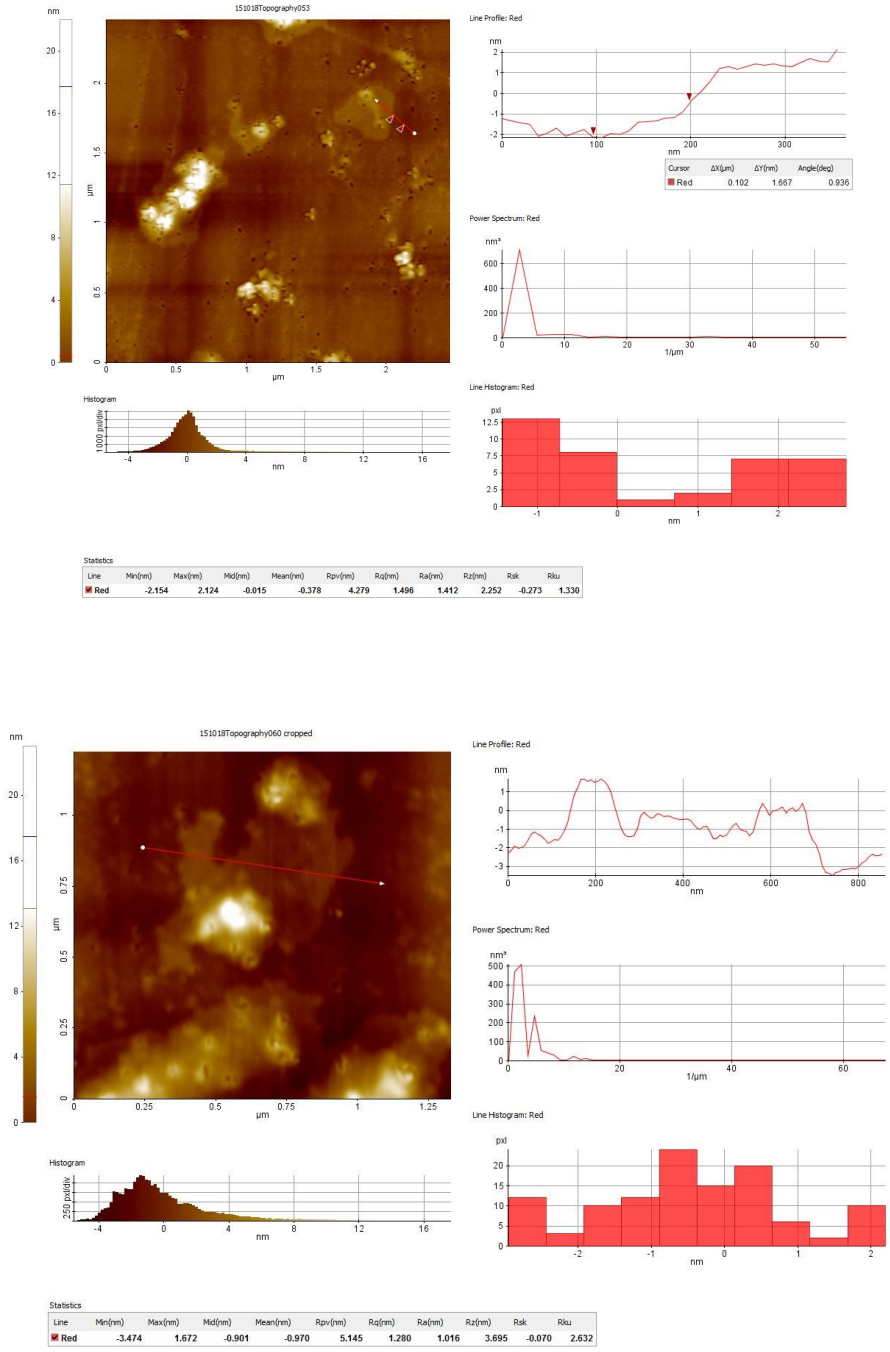

Figure S4. AFM images of GN-30

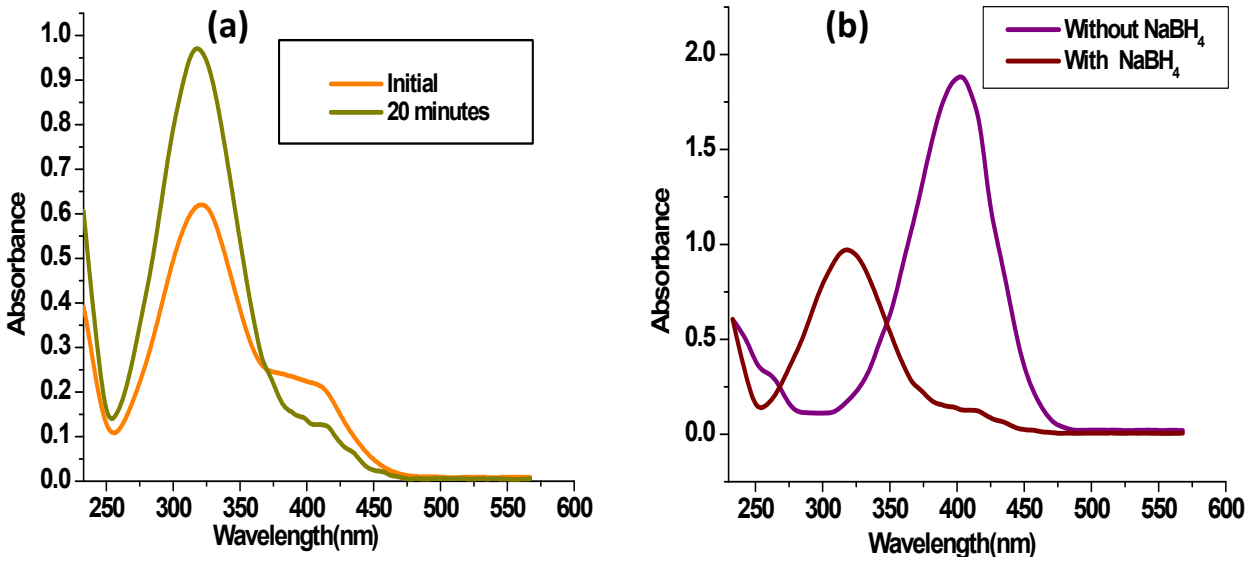

Figure S5: (a) UV-Vis spectrum of reaction mixture after the adsorption 4-Nitrophenol on GN-30 without using $NaBH_4$ and (b) UV-Vis spectrum of reaction mixture after treating with $NaBH_4$ in the absence of GN-30.

Table S1. Weight percentage of metal impurities present in initial graphite and graphene prepared by ball milling obtained from ICP-AES analysis

Material	Fe Wt %	Cu Wt %	Mn Wt %	Cr Wt %	Ni Wt %
Graphite	**0.89**	**0.016**	**0.017**	**0.0075**	**0.001**
Graphene	**1.75**	**0.018**	**0.021**	**0.014**	**0.027**

S1. Surface area determination by methylene blue adsorption method

Surface area of graphene wascalculated by methylene blue adsorption method[1]. This simple method provides more accurate determination of surface area of graphitic materials than the nitrogen adsorption method, which is largely affected by the state of agglomeration. A known amount of material was dispersed in an excess amount of known volume of standard methylene blue solution in 70% ethanol solution via ultrasound sonication and stirred for 2-3 h to attain the equilibrium state. The concentration of the remaining methylene blue solution was determined by measuring the absorbance at 665 nm using UV-Visible spectrophotometer. The adsorption capacity of the catalyst was calculated by the given equation:

$$q_e = \frac{(C_0 - C_e)\, V}{m}$$

where, 'q_e' is the adsorption capacity at equilibrium (mg/g), 'C_0'is the initial methylene blue concentration, 'C_e' is the methylene blue concentration after adsorption (mg/ L), 'V' is the volume of the solution (L) and 'm' is the mass of adsorbent. Also by assuming methylene blue adsorbed on a catalyst forms a monolayer, from the 'q_e' value it can be calculated the surface area of the catalyst by following equation:

$$S = \frac{q_m N A_m}{M}$$

where, ‘S’ is the specific surface area (m^2/g), ‘q_m’ the amount adsorbed methylene blue in the monolayer (g/g),‘Am’ is the area occupied by one MB molecule is $1.30\times10^{-18}m^2$ per molecule. ‘N’ is the Avogadro number (6.02×10^{23}molecules per mol), ‘M’ is the molar mass of methylene blue (373.89 g/mol).