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Supplementary Information

Methanol derived large scale chemical synthesis of brightly fluorescent graphene.

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MD-*bf*-G nanoscroll synthesis

A modified Viculis method[1] was adopted for the synthesis of nanoscroll. A dispersion of MD-*bf*-Graphene sheets (200 mg) in methanol (20 mL) was sonicated in sonochemical bath (33 kHz, 350W) at room temperature for 60 min. Upon sonication, the MD-*bf*-Graphene sheets curl onto themselves, forming nanoscrolls.

References

1. L. M. Viculis, J. J. Mack and R. B. Kaner, *Science*, 2003, 299, 1361.

SEM Supplementary data

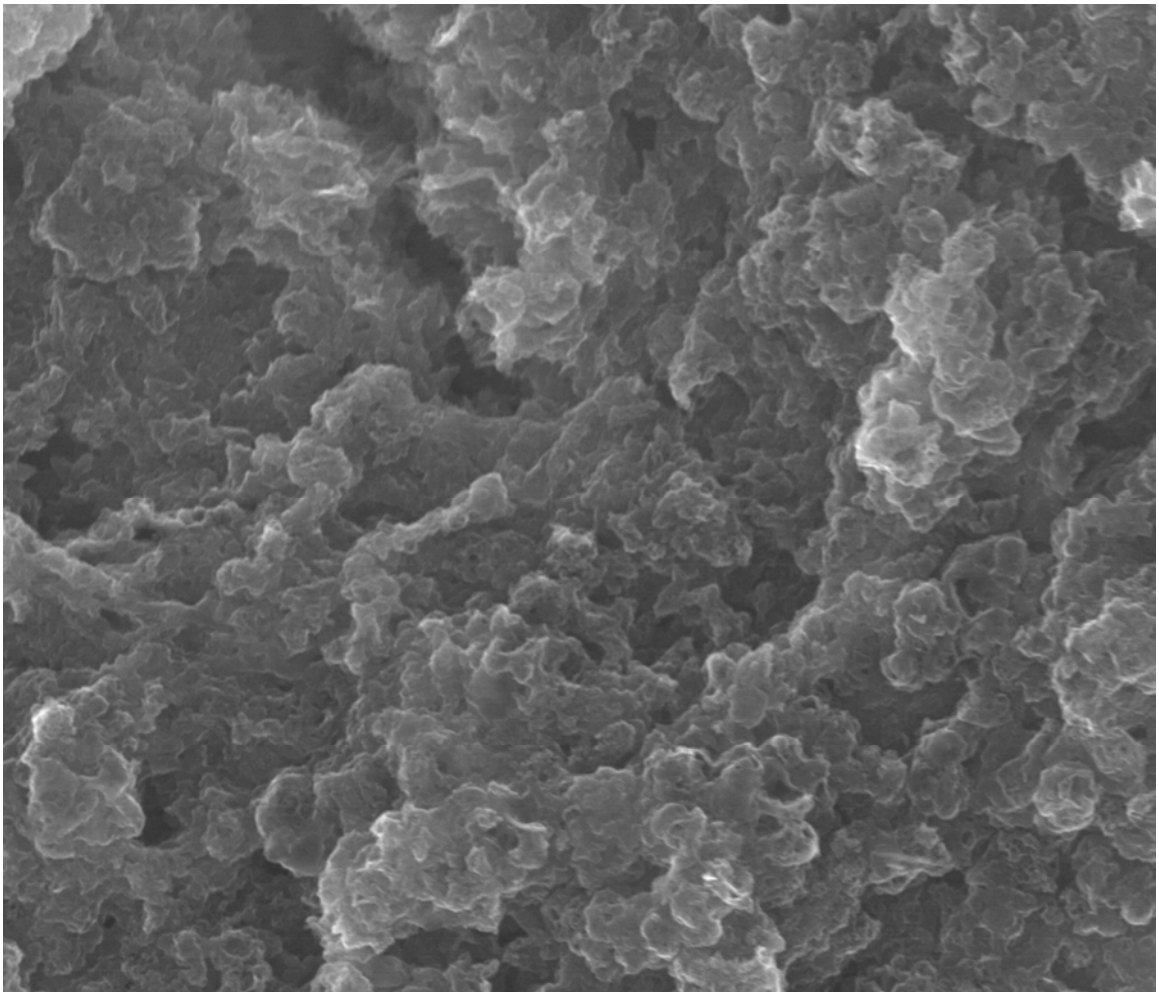

Figure S1 SEM image of the unwashed methanol-derived *bf*-graphene.

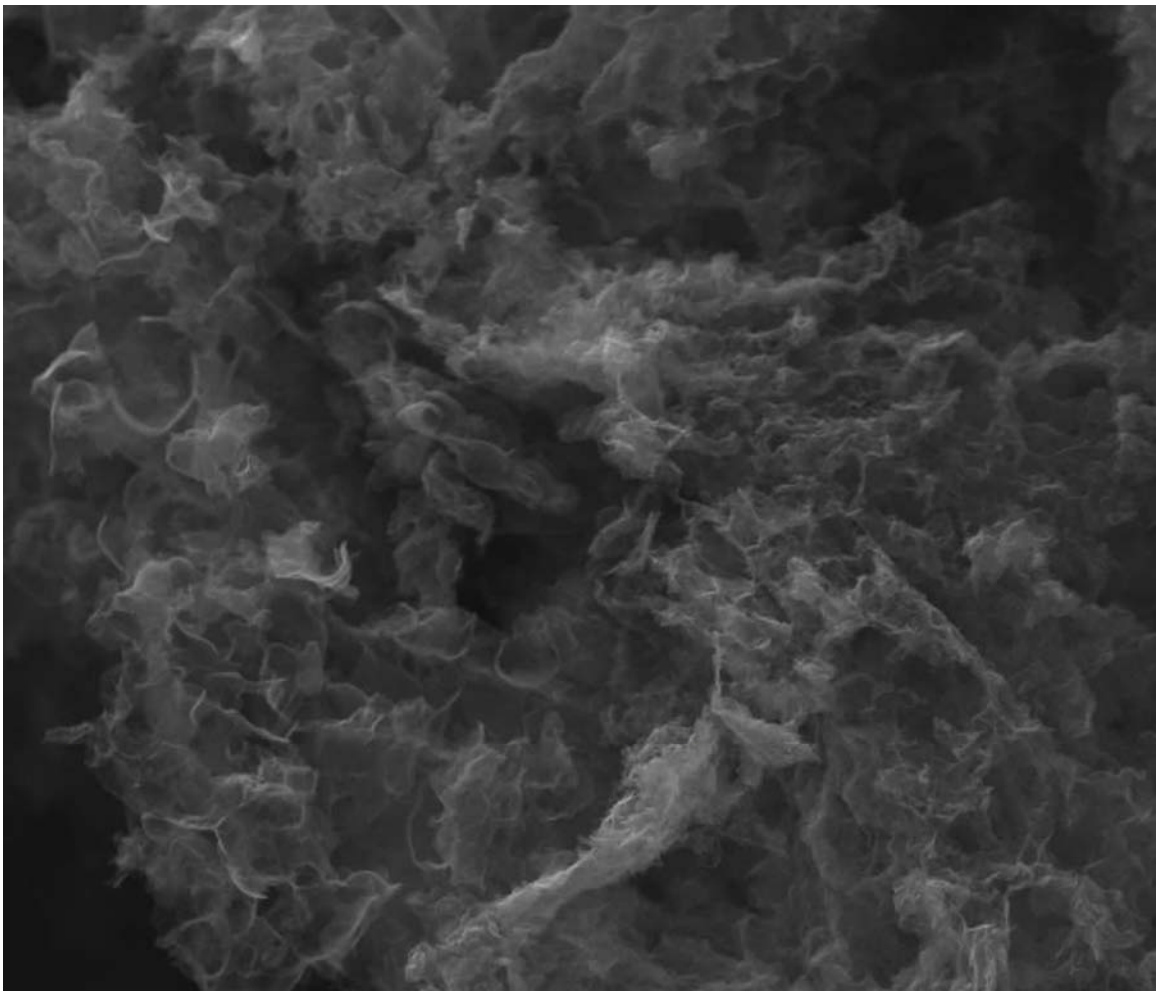

Figure S2 SEM image of the thoroughly washed methanol-derived *bf*-graphene until the pH reach to 6.6.

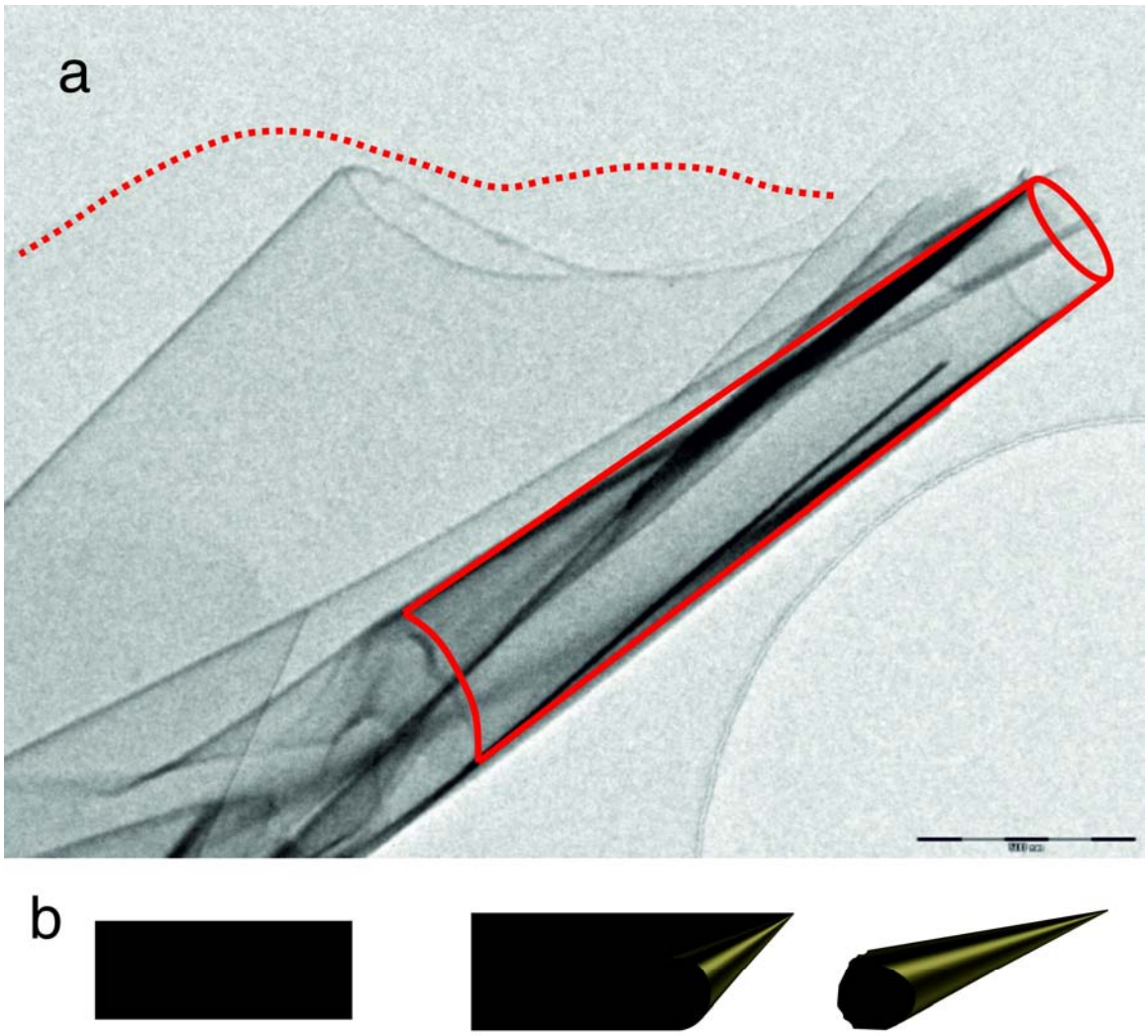

Figure S3 TEM from Fig. 2d (main text). a, the red line is drawn to illustrate the sheets and scrolls. B, Schematic presentation of sonication induced methanol-derived *bf*-graphene scrolls.

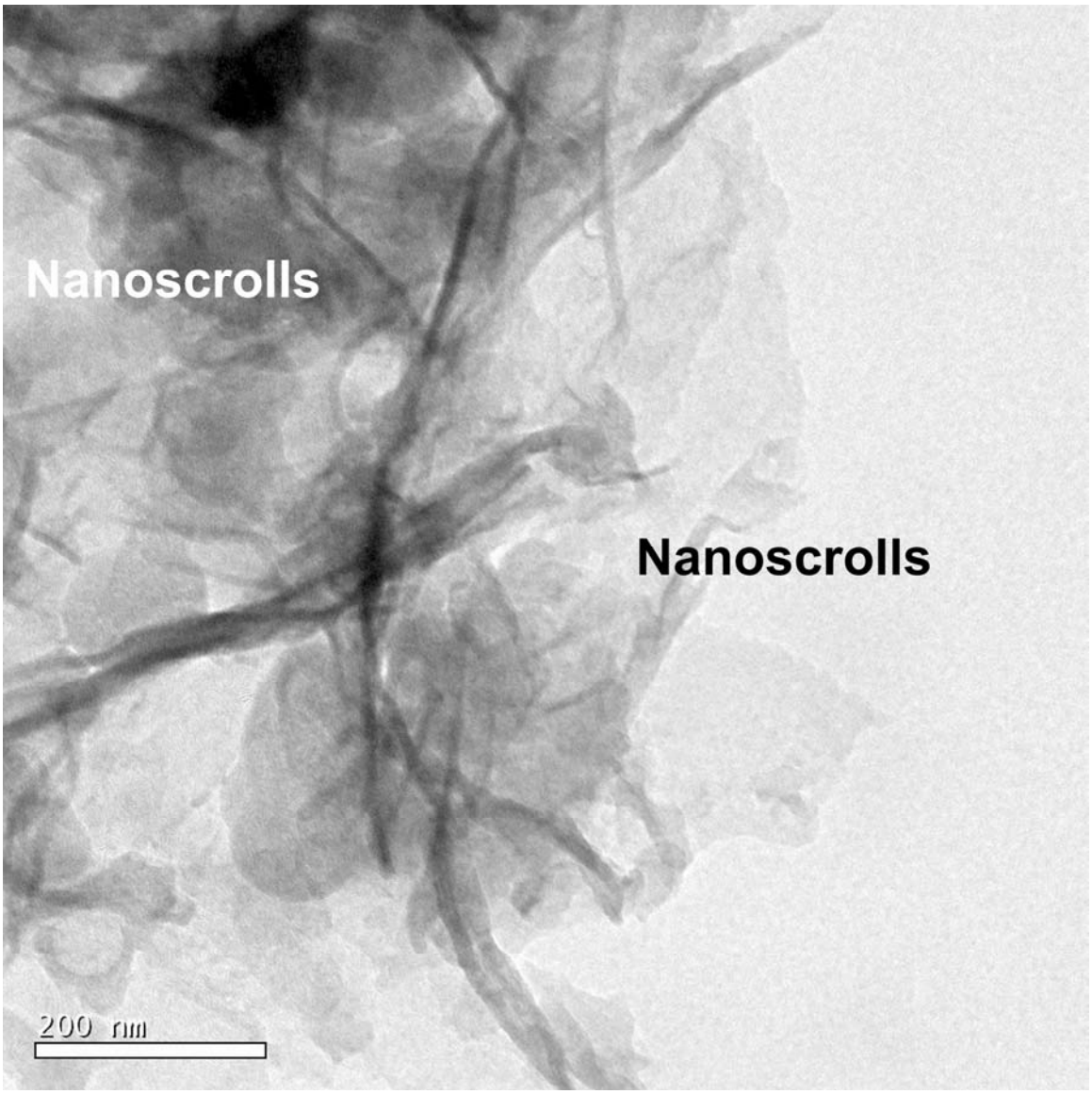

Figure S4: TEM image of MD-bf-G nanoscrolls.

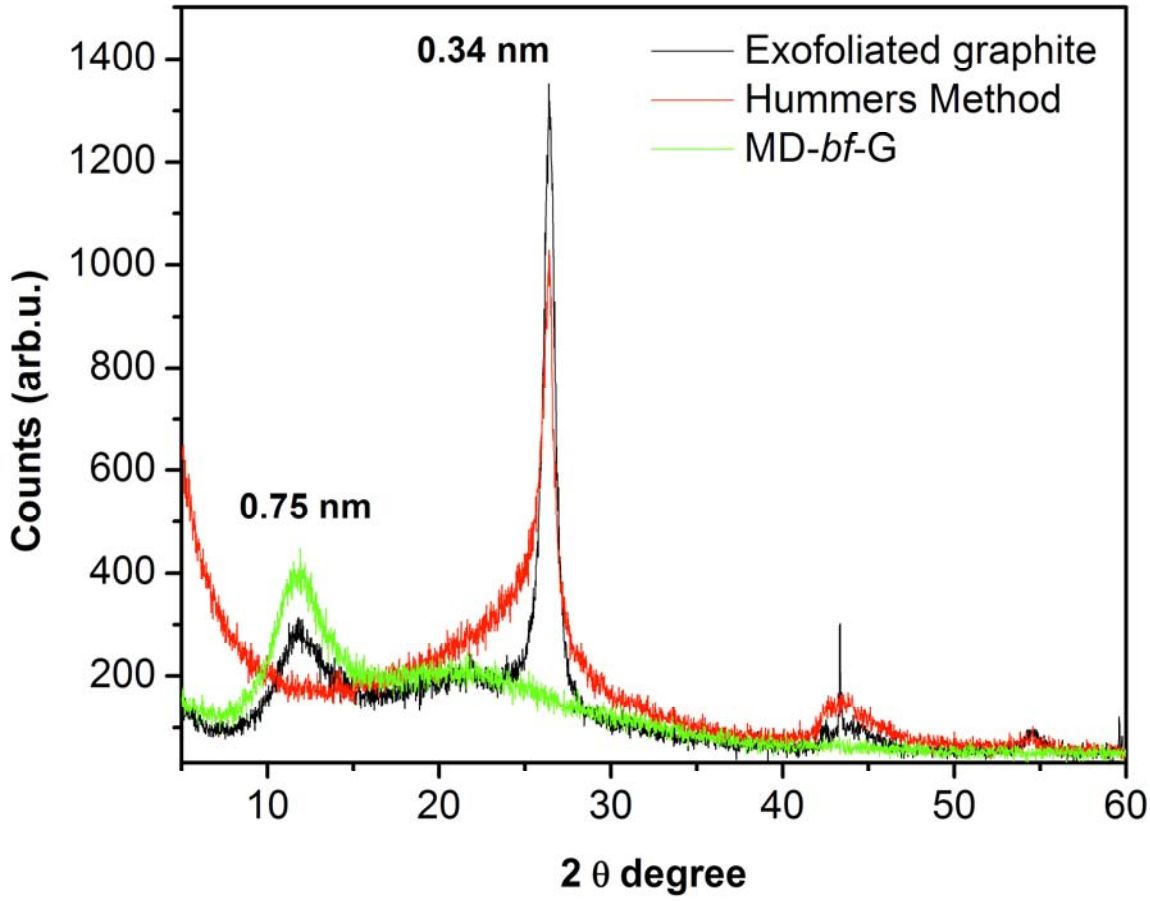

Figure S5 X-ray Diffraction Analysis of MD-*bf*-G: XRD spectra of exofoliated graphite, graphene synthesized using Hummer's method and MD-*bf*-G.

Thermogravimetric Analysis (TGA)

To ensure the compositional details of as synthesized graphene either in form of impurity or attached functional group components along with ruptured, chaotic small graphene fragments and modulation in defect concentration with temperature is exploredbyquantifying the thermal behavior of graphene[1].The thermal gravimetric analysis (TGA), supported by energy directed parameters from Deferential Scanning Calorimetry (DSC) are performed in temperature program range over 50° C to 1000° C with scan rate of 20° C/minute in N_2 gas atmosphere. In a typical TGA curve (Fig. 1.) five degradation steps are noticeable in the whole temperature range. To begin with, in

step-I degradation, 14.6% mass loss is observed in temperature range extended over 55.3° C - 131.3° C that is most likely due to moisture content concomitant with graphene flakes. This decomposition is supported by endothermic nature of enthalpy change of about 38.3 J/g. The second step degradation of about 34.4% (14.6% + 19.7%) in temperature range of 157.5° C to 299.6° C could be ascribed as the pyrolysis of labile oxygen functional groups[2] yielding respective amount of CO and CO_2. Such decomposition of functional groups generates large exothermic enthalpy change of around -287.3 J/g. The probable formation of these groups despite of its synthesis in inert atmosphere is due to oxidation of highly active surface of graphene and it's washing in ambient atmosphere with DI water. A moderate but distinct weight loss of around 37.7% (34.4% + 3.3%) in the limit of 290° C to 380° C is observed that is presumptive to be related to the decomposition of stable oxygen functional groups. The exothermic enthalpy change of -21.9 J/g validates the decomposition of these compounds present in traces. In between 635° C to 680° C another mass loss is detected of about 39.4% (37.7% + 1.6%) with exothermic reaction coordinate of -11.7 J/g. Though not very significant mass loss, it is related to decomposition of carbon fragments[3] and generation of more defects and least crystallinity. However, the exact amount of oxygen atoms trapped in graphene sheets is not clear; the TGA curve supports the presumable explanations as expected. The most significant weight loss of 65.6% (39.4% + 26.2%) in temperature range of 710° C to 1000° C is revealed with large endothermic enthalpy change of 287.8 J/g. The most pertinent explanation for this decomposition is still not identified but this could be related to large scale distortion of graphene sheets with rapid thermal expansion as evident by large volume expansion and large mass loss (from aviating graphene sheets in TGA

instrument). In an average, as a whole approximately 70.3% weight loss has been documented over the full range temperature program.

References

1. P. Hojati-Talemi, G. P. Simon, *Carbon*, 48, 3993-4000 (2010)
2. S. Stankovich, D. A. Dikin, K. A. Kohlhass, A. Kleinhammes, Y. Jia, Y. Wu, S. T. Nguyen, R. S. Ruoff, *Carbon*, 45, 1558-1565 (2007)
3. S. Stankovich, D. A. Dikin, K. A. Kohlhass, A. Kleinhammes, Y. Jia, Y. Wu, S. T. Nguyen, R. S. Ruoff, *Carbon*, 45, 1558-1565 (2007)

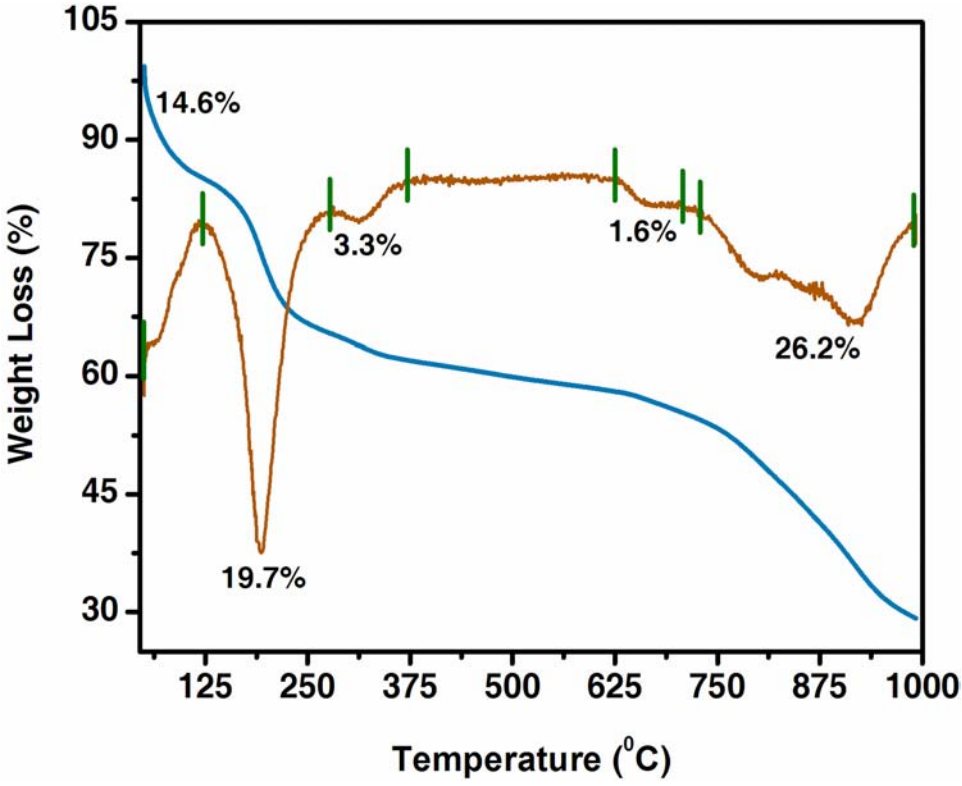

Figure S6 TGA of a pre-dried methanol-derived *bf*-graphene sample heated under the flow of nitrogen to an isothermal temperature of 1000°C.

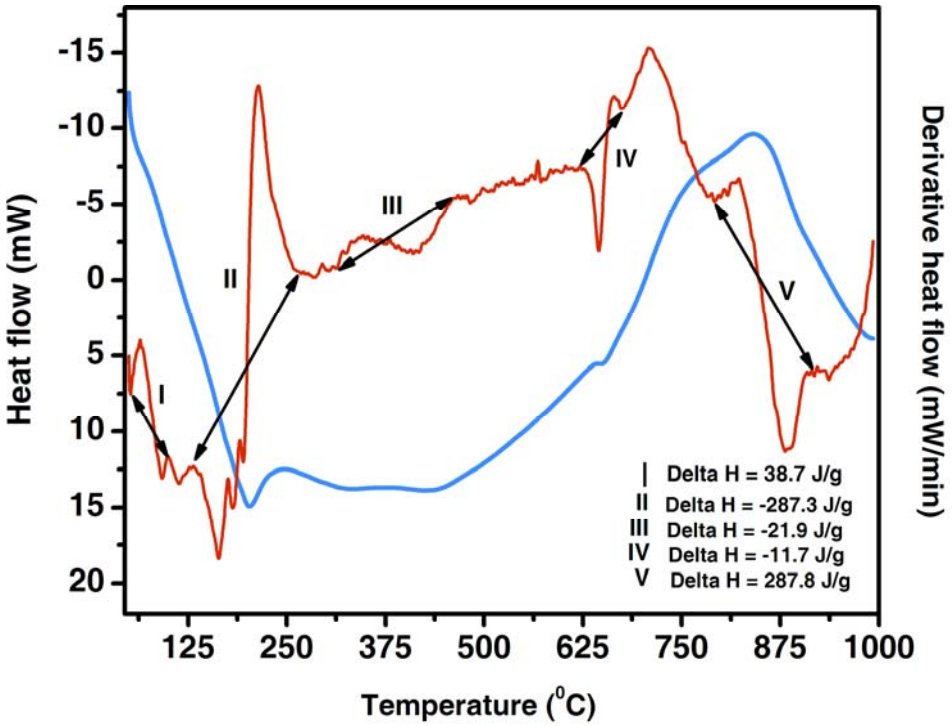

Figure S7 DSC of a pre-dried methanol-derived *bf*-graphene sample heated under the flow of nitrogen to an isothermal temperature of 1000°C.

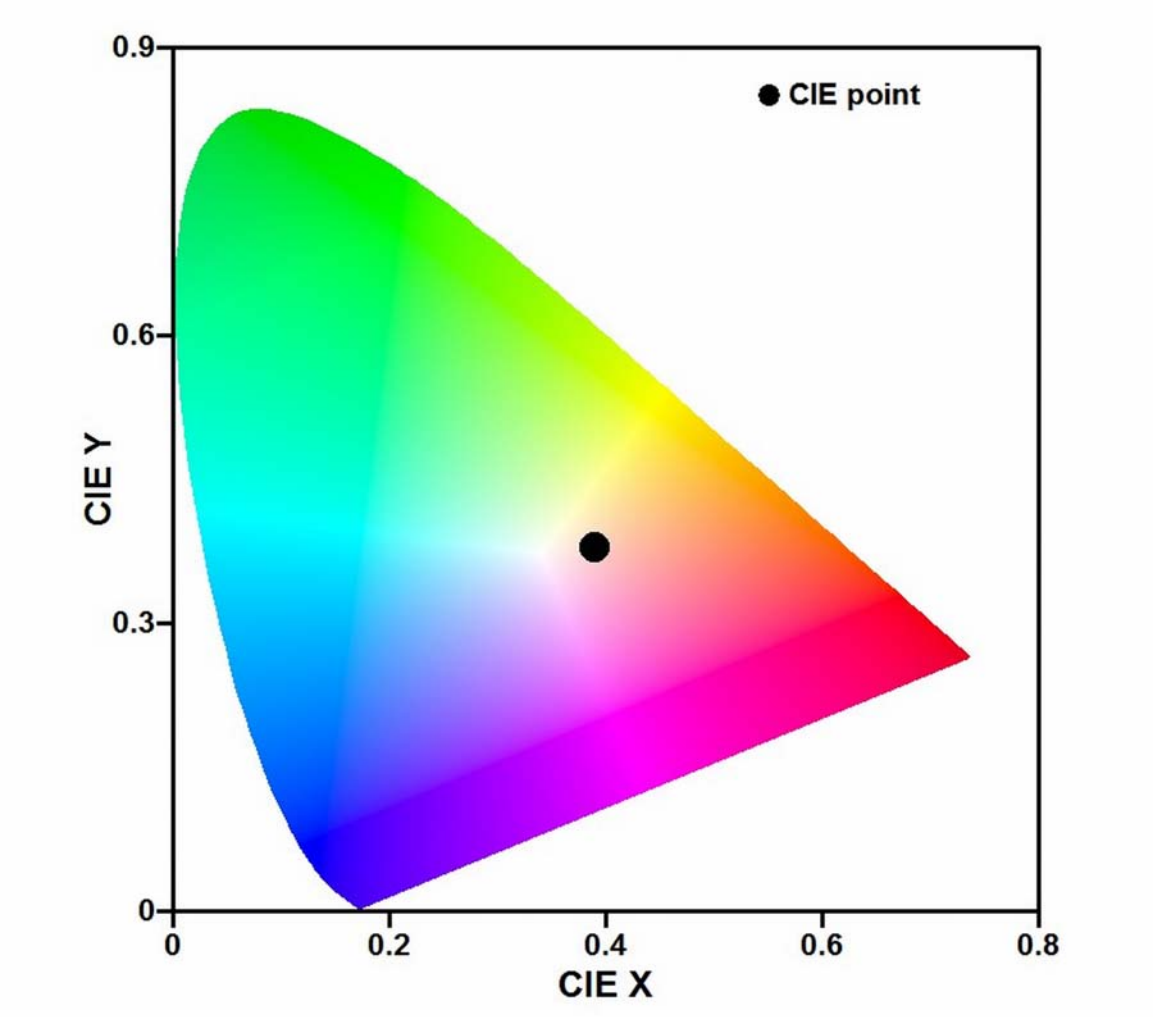

Figure S8 Corresponding Commission Internationale de l'Eclairage (CIE) chromaticity coordinates of the white emissions from the methanol-derived *bf*-graphene shown in Figure 4d in the main manuscript