

Supplementary Information

Fast grown up self-assembled polythiophene/graphene oxide nano composite thin film at air-liquid interface for high mobility polymer thin film transistor.

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Fig. S1: Picture of GO in water (left) and GO + water/GO+ Chloroform after sonication (right) showing dispersion in two phases.

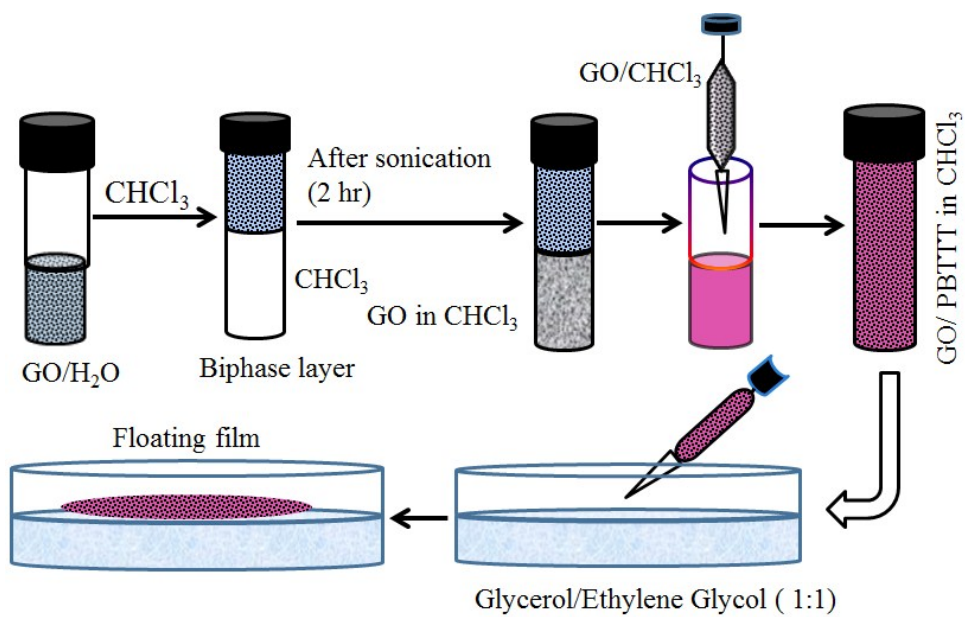


Fig. S2 Schematic of fabrication of GO decorated polymer film.

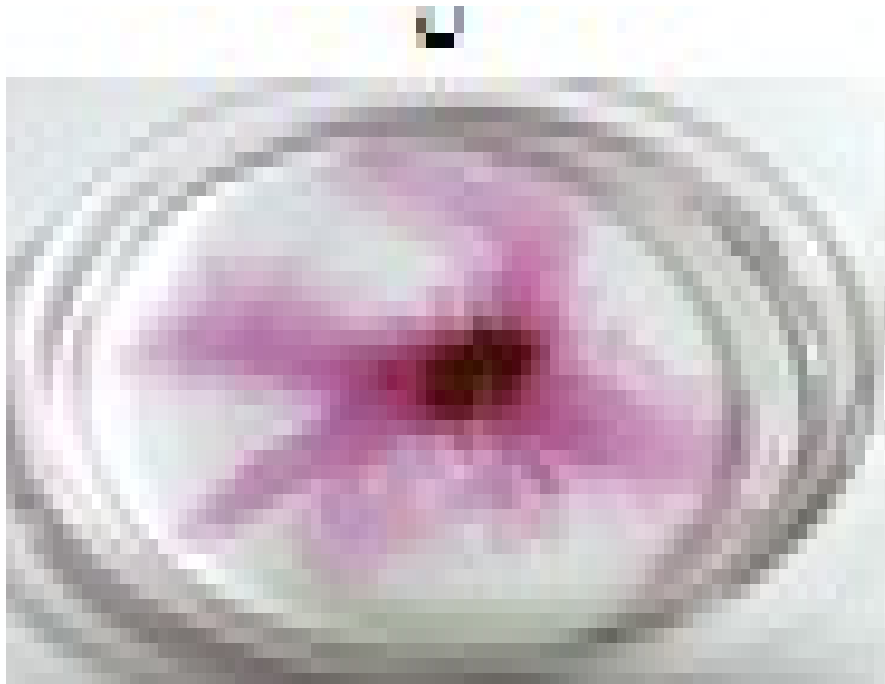


Fig. S3 Floating film of composite at glycerol and ethylene glycol (1:1) mixture.

FTIR studies-

The FT-IR spectrum shows bands at 582 cm⁻¹ and 1045.74 cm⁻¹ corresponding to epoxy (C-O-C) stretching mode, 1212 cm⁻¹ and 1386.68 cm⁻¹ bands attributed to bending mode of hydroxyl groups (C-OH) over the basal plane of graphene oxide, 1729 cm⁻¹ and 1809 cm⁻¹ corresponds to carbonyl functional groups of -COOH arranged at edge of graphene oxide sheets. The aromatic C=C stretching band occur at 1615.38 cm⁻¹.

Following procedure was followed for quantitative analysis of FTIR spectrum,:

1. The resulting spectrum was multiplied by -1 so that all peaks are reversed.
2. The baseline is subtracted from raw data using origin18 software (baseline mode-create baseline –baseline treatment) then different peaks were found and fitted peaks.
3. Different peaks area were calculated viz. peak 1 to peak 12. The peak 1 corresponds to C=C bond stretching at 1615.38 cm⁻¹ having fitted area 566.06.
4. The sum of all oxygen related bands calculated by subtracting the aromatic C=C band at 1615.38 from the total spectra i.e. aromatic C=C band area is subtracted from total area (by adding areas covered by all peaks).
5. Ratio of oxygen related band area to the total area is calculated as follows.

$$\frac{A(ORB)}{A(TOTAL)} = \frac{A(TOTAL) - A(C=C)}{A(TOTAL)} = ORB:TOTAL$$

Above equation is used as a measure of degree of functionalization of graphite sheet. Using above equation ORB:TOTAL ratio came out to be 0.81.

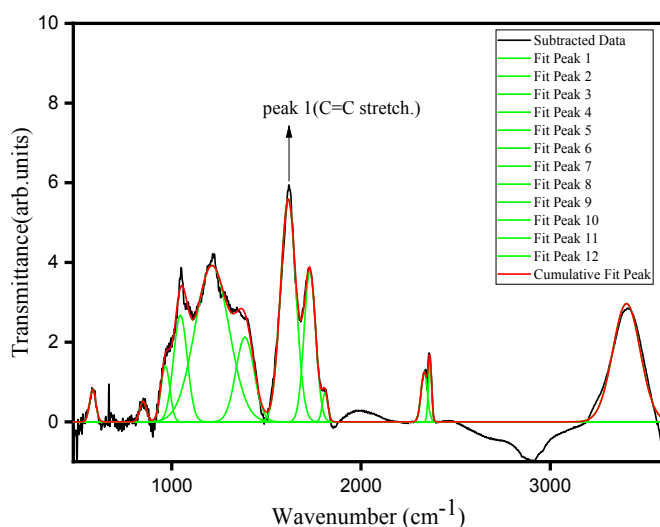


Figure S4 Fitted curve of FT-IR spectrum of GO

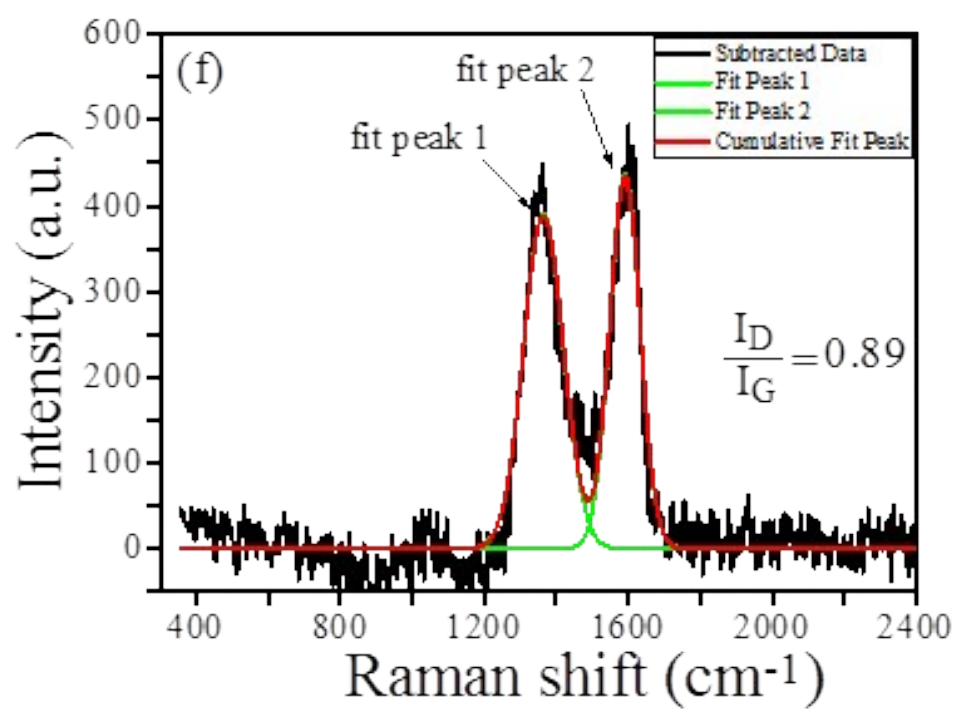


Figure S5 Fitted curve of Raman spectrum of GO

Fluorescence imaging of hybrid film obtained via FTM is carried out using fluorescence microscopy for investigations of distribution GO. Fig. S6 demonstrates the fluorescence image of hybrid film. Hybrid film shows two colours of emission viz. green for GO and brick colour for PBTTT appears after illumination with blue light. Green colour flakes uniformly dispersed in brick red colour.

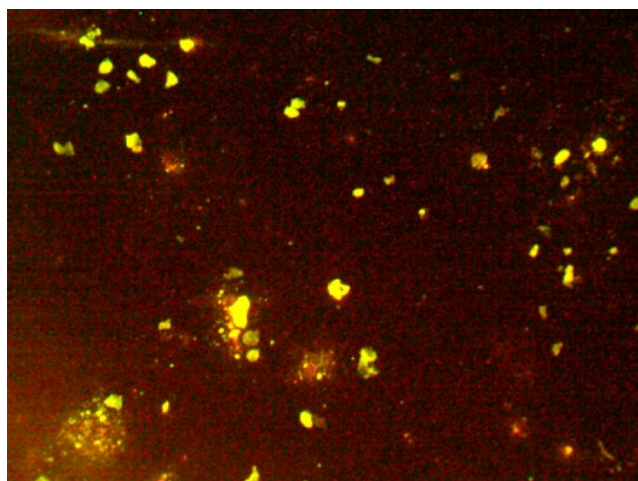


Fig. S6: Fluorescence image (100 x) of PBTTT/GO film formed by FTM technique

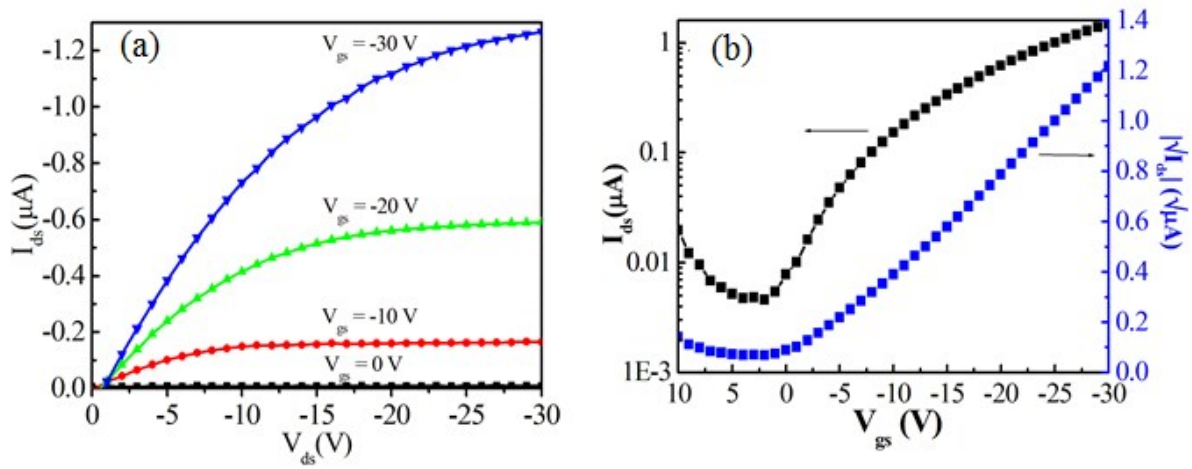


Fig. S7 (a) I_d - V_d output and (b) transfer characteristics of pristine PBTTT thin film.

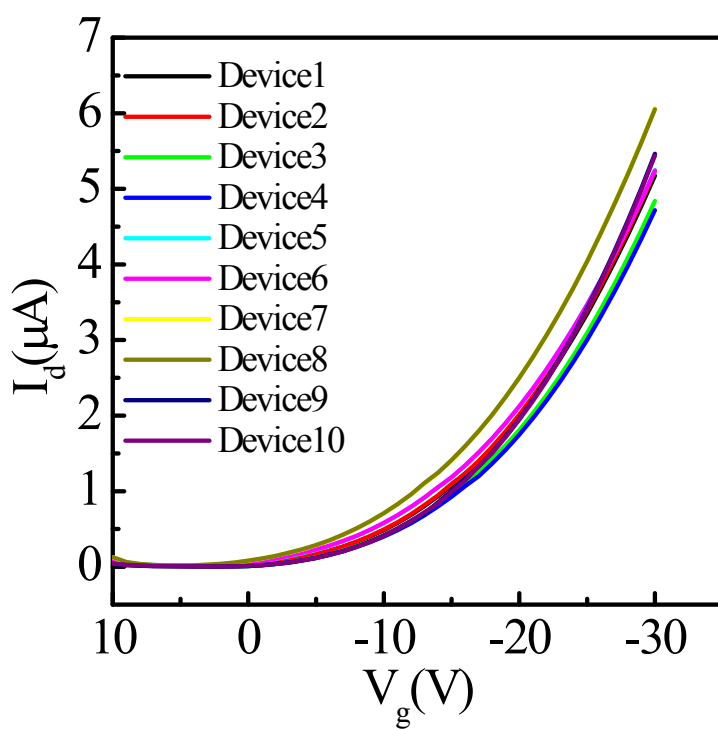


Fig S8: I_d - V_g transfer characteristics of PBTTT/GO nanocomposite thin film at 10 different places at $V_d = -30$ V