Support information

Aramid nanofibers functionalized graphene nanosheets for polymer reinforcement

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1 Synthesis of reduced graphene oxide (RGO)[1]

200 mg of GO were first dispersed in 200 mL of water with sonication until the dispersion became clear with no visible particulate matter. Afterward, 1.00 mL of hydrazine hydrate was added into the GO aqueous dispersion. Then, the dispersion was refluxed at 100 °C for 24 h. Then, the reduced graphene oxides (RGO) were gradually precipitated from the dispersion. The RGO was isolated by filtration and washed copiously with water and methanol, and dried in vacuo at 80 ^{o}C for 8 h.

2 Fabrication of RGO/PMMA composite films

The preparation of RGO/PMMA composite films was based on the solvent casting method. First, a certain amount of RGO were first exfoliated and dispersed in NMP by sonication of 3 h at room temperature and then 1.0 g of PMMA was added and dissolved in the RGO-NMP dispersion under magnetic stirring. The obtained dispersions were sonicated for another 30 min. The resultant mixtures were cast onto a plate glass and dried at 80 ^{o}C for 12 h. To ensure the complete removal of NMP, the films were dried by vacuum drying at 80 ^{o}C for another 12 h.

3 Preparation of ANFs/PMMA composite films

ANFs/DMSO dispersion can obtained by the method demonstrated by Kotov's group[2]. Different amounts of ANFs/DMSO dispersion (2.0 mg/mL) were diluted to 15 mL separately. And then, PMMA of 1.0 g was added and dissolved in the ANFs/DMSO dispersion under room temperature. The obtained dispersions were sonicated for another 30 min. The resultant mixtures were cast onto a plate glass and dried at 80 ^{o}C for 12 h. The obtained ANFs/PMMA composite films were washed and immersed into the hot water for removing the residue KOH introduced from the ANFs/DMSO dispersion. Finally, the ANFs/PMMA composite films were dried by vacuum drying at 80 ^{o}C for 12 h.

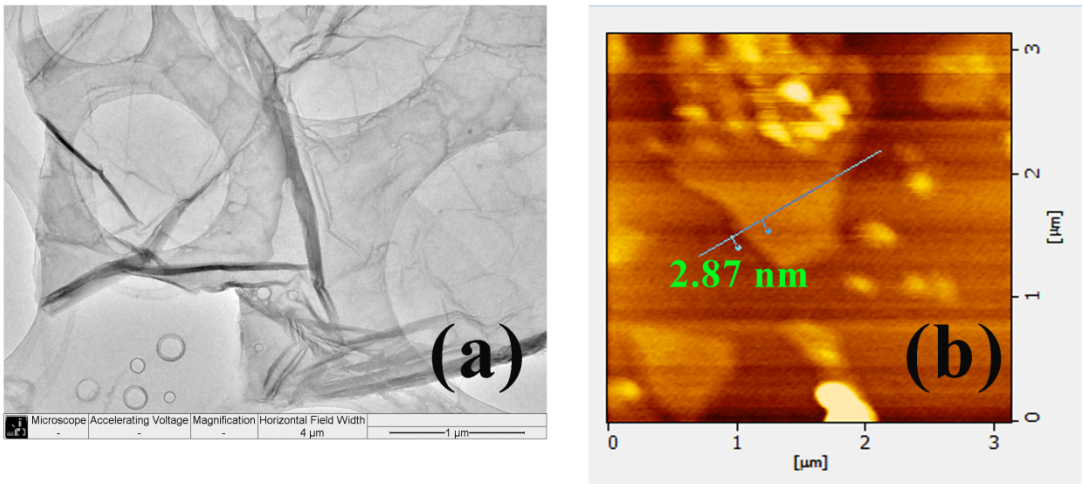

Fig.S1 Typical TEM and AFM images of RGO

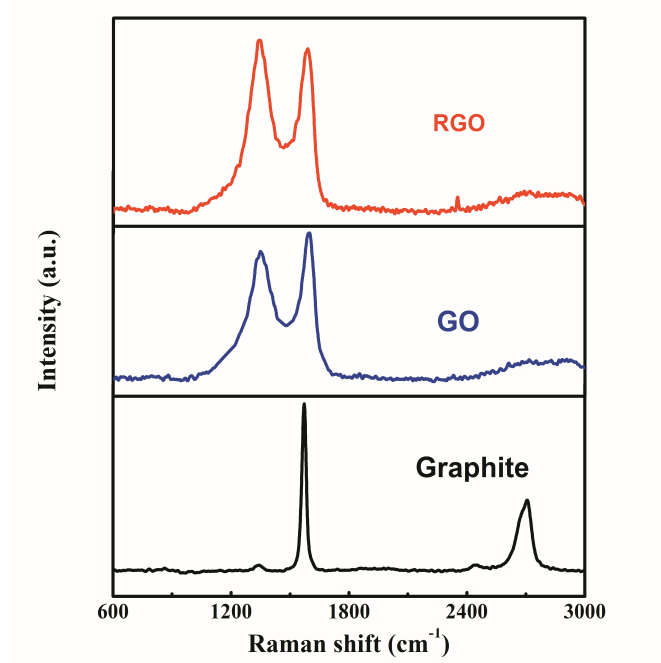

Fig.S2 Raman spectrum of graphite, GO and RGO

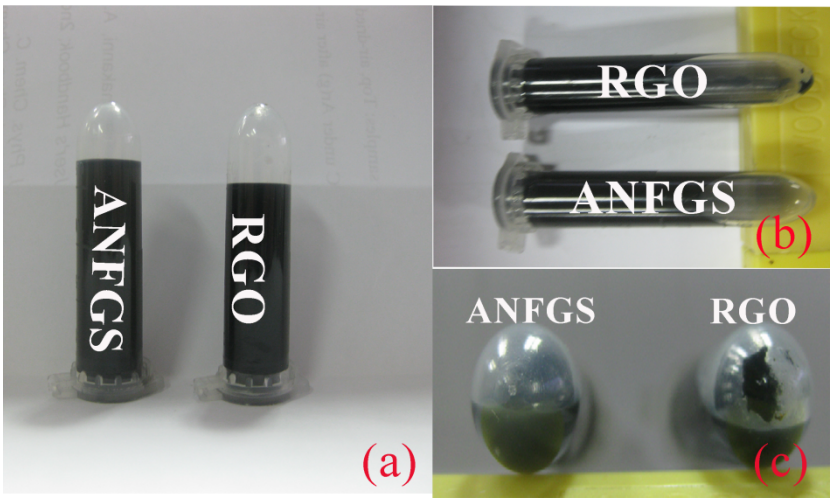

Fig.S3 (a): The dispersions of ANFGS (0.5 mg/mL) and RGO (0.5 mg/mL) with sonication of 2 h, (b) and (c): The dispersion state of ANFGS and RGO in NMP solution after centrifuging for 10 min at 3000 rpm

Fig.S4 Photographs of NMP dispersion of ANFs (1.0 mg/mL) after 3 days

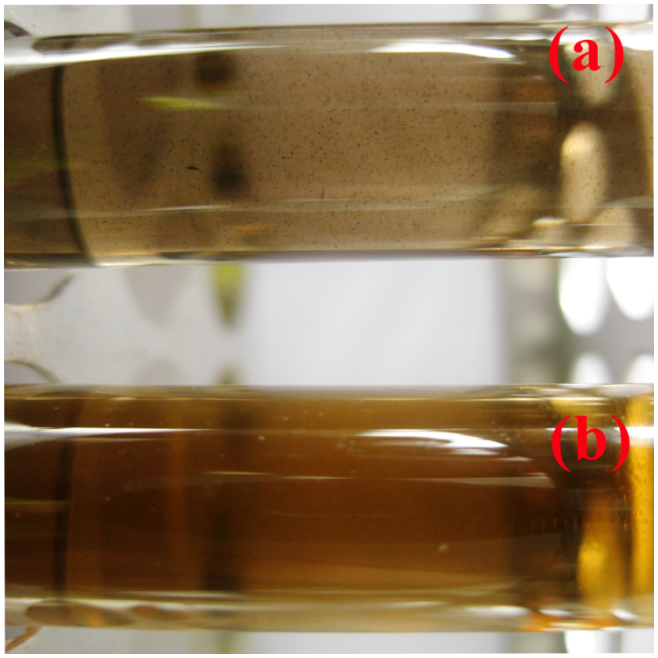

Fig.S5 Photographs of (a) GO/DMSO dispersion (0.05 mg/mL) with solid GO dispersed by direct sonication; (b) GO/DMSO dispersion (0.05 mg/mL) obtained by the method of solution-exchange

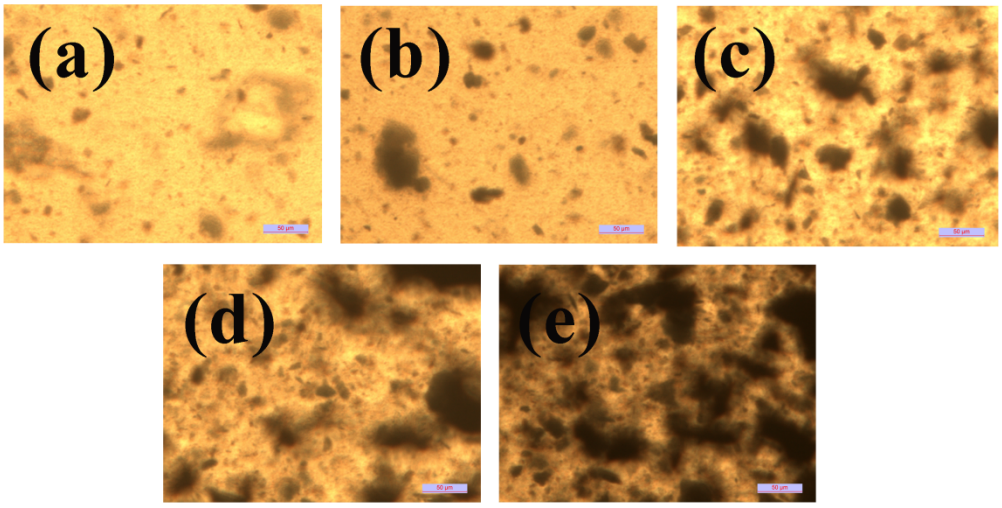

Fig.S6 Optical microscopic images of RGO/PMMA containing 0.1 wt% (a), 0.3 wt%(b), 0.5 wt%(c), 0.7 wt%(d) and 1 wt%(f) of ANFGS

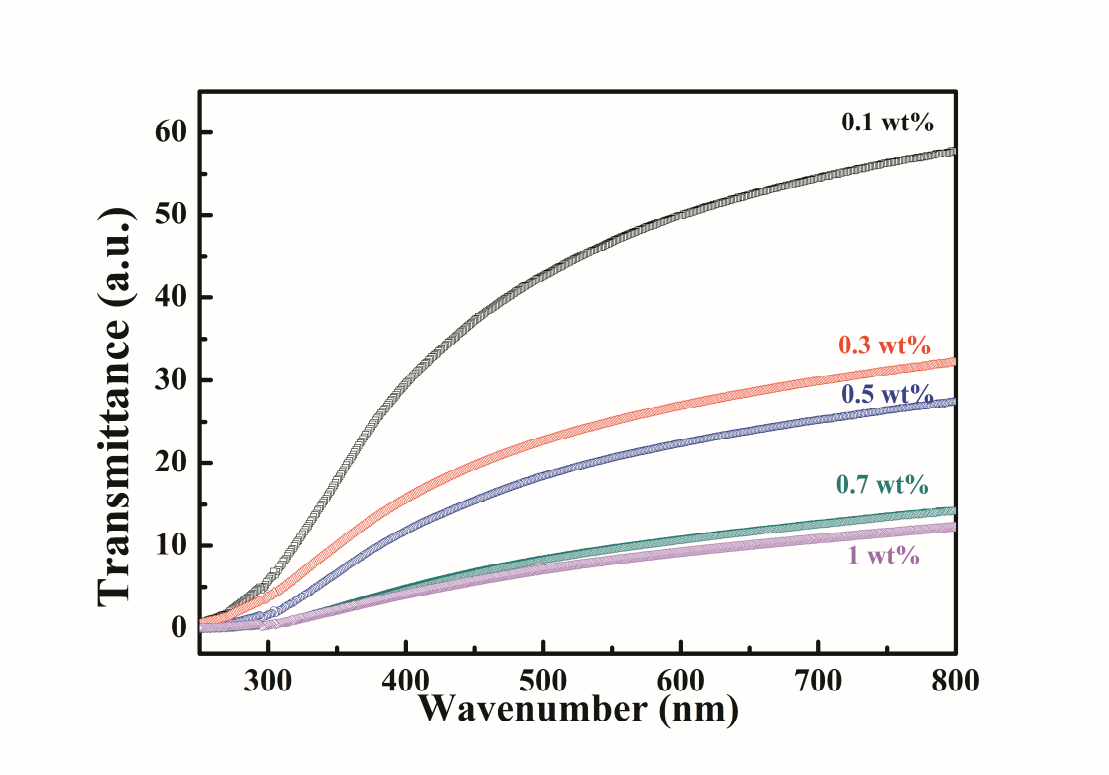

Fig.S7 Transparency of RGO/PMMA composite film with various weight fractions of RGO

1. S. Stankovich, D. A. Dikin, R. D. Piner, K. A. Kohlhaas, A. Kleinhammes, Y. Jia, Y. Wu, S. T. Nguyen and R. S. Ruoff, *Carbon*, 2007, **45**, 1558-1565.
2. M. Yang, K. Cao, L. Sui, Y. Qi, J. Zhu, A. Waas, E. M. Arruda, J. Kieffer, M. D. Thouless and N. A. Kotov, *Acs Nano*, 2011, **5**, 6945-6954.