Electronic Supplementary Material (ESI) for Chemical Communications

Stable aqueous colloidal solutions of intact surfactant-free graphene nanoribbons and related graphitic nanostructures

Supplementary Information

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Experimental Part

Materials

The MWCNTs were provided by Mitsui & Co. and were used without further treatment. The splitting of MWCNTs was performed as we described earlier (1,2). The 50 wt% hypophosphorous acid was purchased from Sigma-Aldrich. The water was HPLC grade from Sigma-Aldrich.

Functionalization and preparation of colloid solutions

30 mg of GNRs (or MWCNTs) were added into 30 mL of 50 wt% H_3PO_2 and sonicated for 2-3 min using a bath sonicator. The resulting dispersion was filtered through the porous membrane (4 μm pore size) with suction. For washing, the filter cake was first rinsed with ~100 mL water on the filter. Next the wet filter cake was collected from the filter and redispersed in 100 mL of

water with sonication. The dispersion was filtered again to separate modified GNRs (HP-GNRs) from the washing water. These redispersion-filtration cycle was repeated one more time. To prepare colloidal solutions, the purified HP-GNRs were collected from the filter while still wet and redispersed in water with mild sonication in cup sonicator for 20 – 30 s.

Characterization

UV-Vis absorbance spectra were acquired using a Shimadzu UV-3101PC UV-Vis-NIR scanning spectrophotometer. The ζ-potentials were measured using a Malvern Zen 3600 Zetasizer based on the Smoluchowski equation (3).

Additional Figures

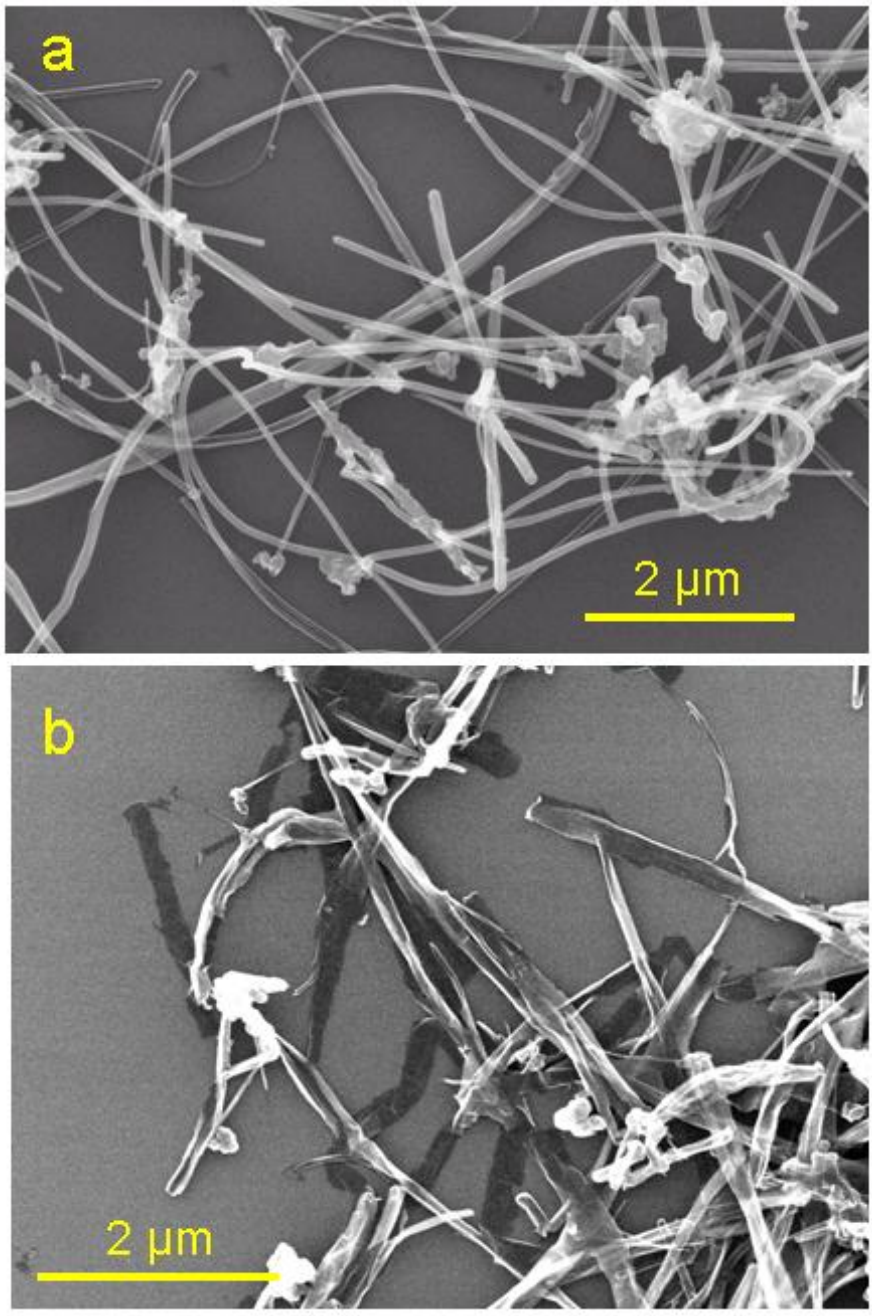

Figure S1. SEM images of (a) Mitsui-MWCNTs (b) Mitsui-MWCNT-derived GNRs.

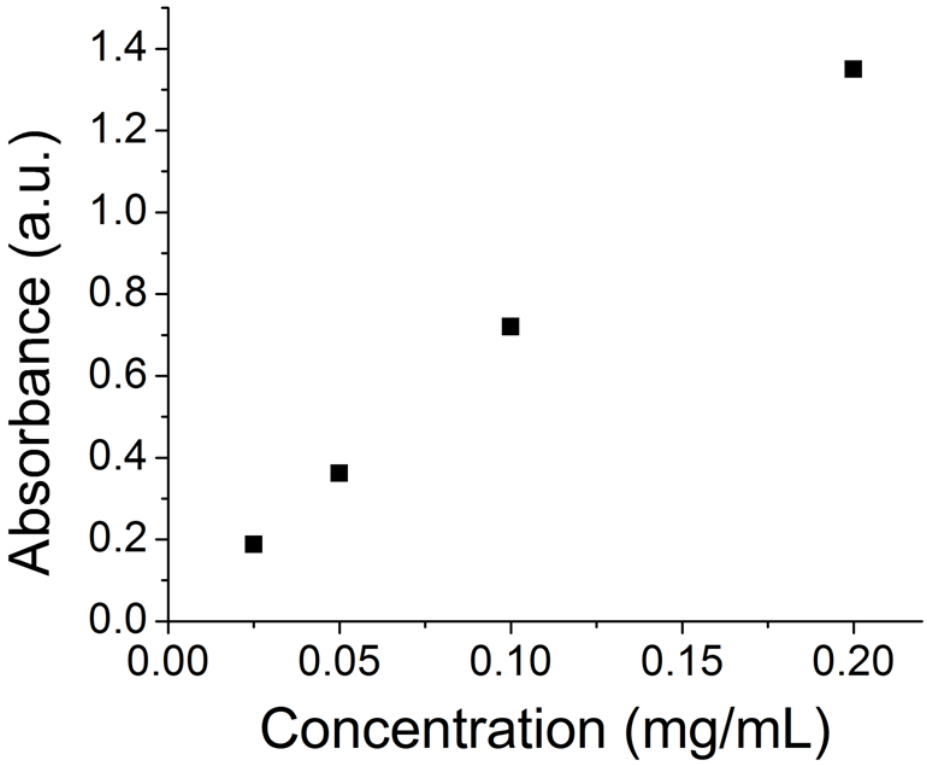

Figure S2. Absorbance of as-prepared HP-GNRs colloid solutions with different GNRs content. The absorbance values are taken at 272 nm.

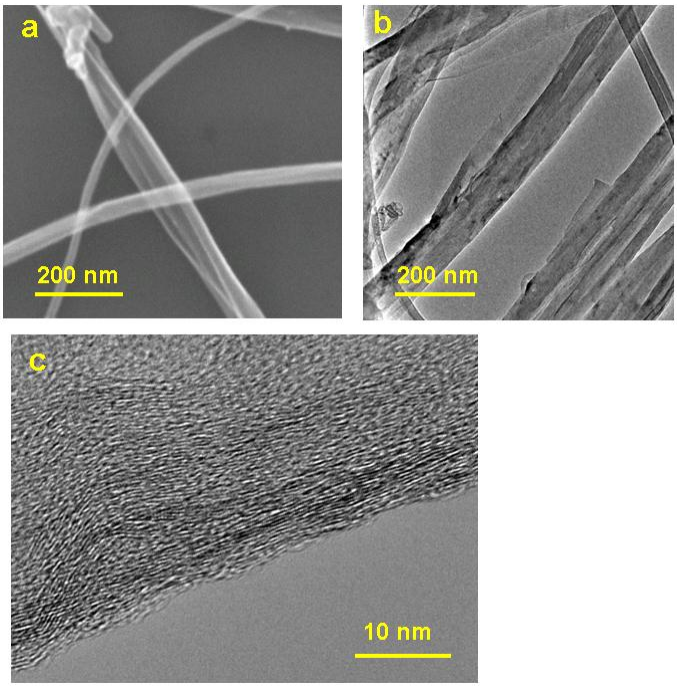

Figure S3. (a) SEM, (b) TEM, and (c) HRTEM images of HP-GNRs made from Mitsui MWCNTs.

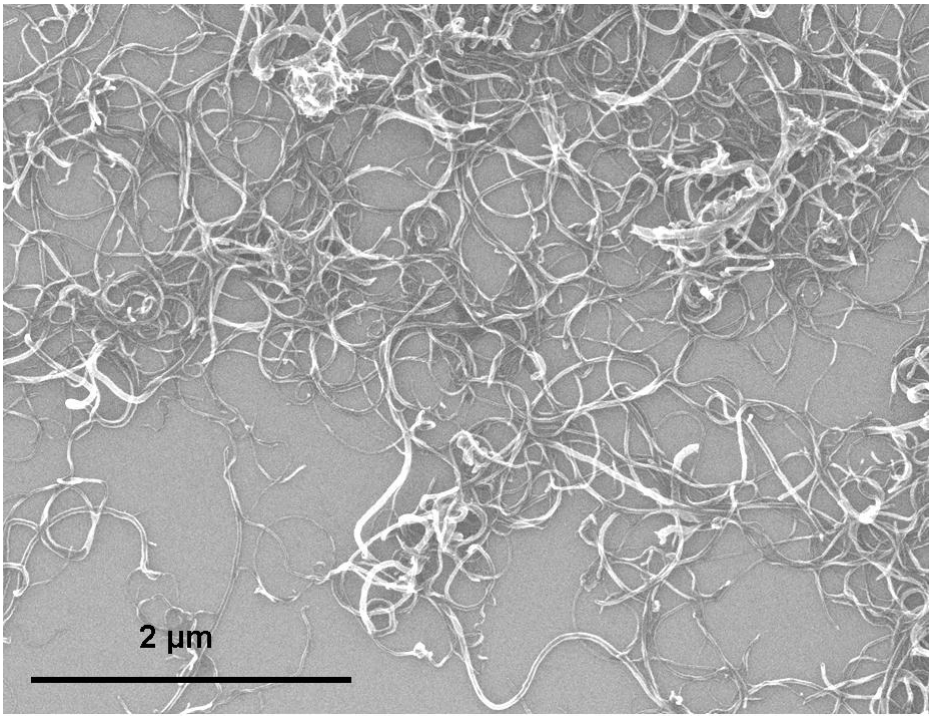

Figure S4. SEM image of Baytube-MWCNTs

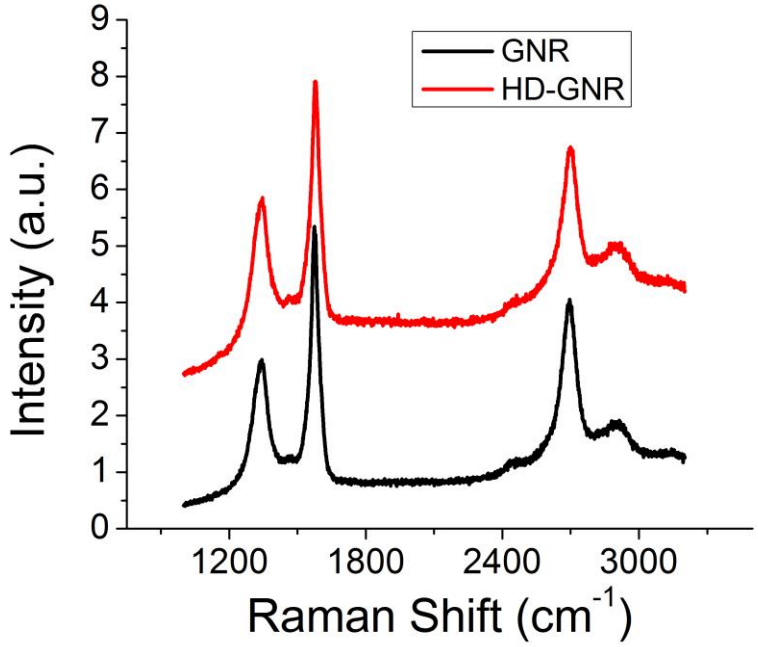

Figure S5. Raman spectra of GNRs and HD-GNRs

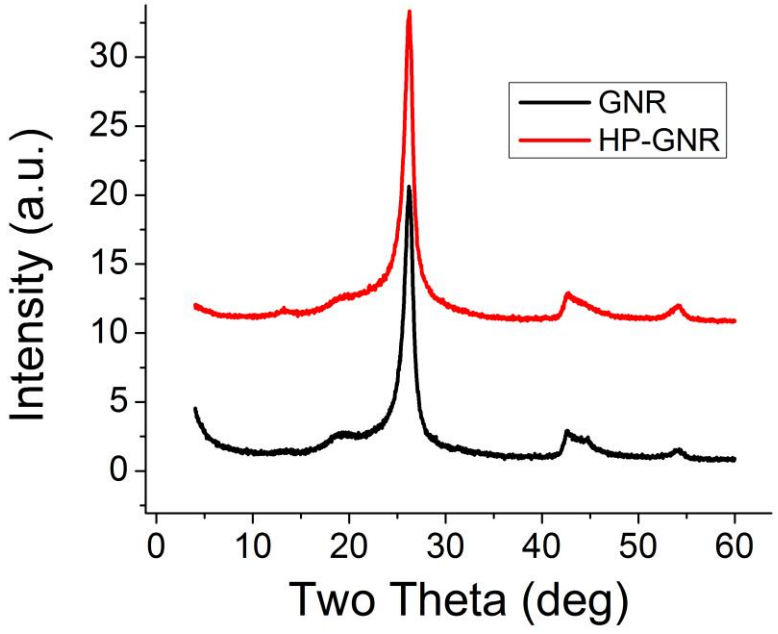

Figure S6. X-Ray diffraction data for GNRs and HD-GNRs.

1. Kosynkin, D. V.; Lu, W.; Sinitskii, A.; Pera, G.; Sun, Z.; Tour, J. M. Highly conductive craphene nanoribbons by longitudinal splitting of carbon nanotubes using potassium vapor. *ACS Nano*, 2011, 5, 968-974.
2. Genorio, B.; Lu, W.; Dimiev, A.M.; Zhu, Y.; Raji, A.; Novosel, B.; Alemany, L.; Tour, J.M.; In-situ intercalation replacement and selective functionalization of graphene nanoribbon stacks. *ACS Nano* 2012, 6, 4231-4240.
3. Hunter, R.J. *Introduction to Modern Colloid Science*, Oxford University Press, Oxford – New York – Melbourne, 1993