

Supplementary information

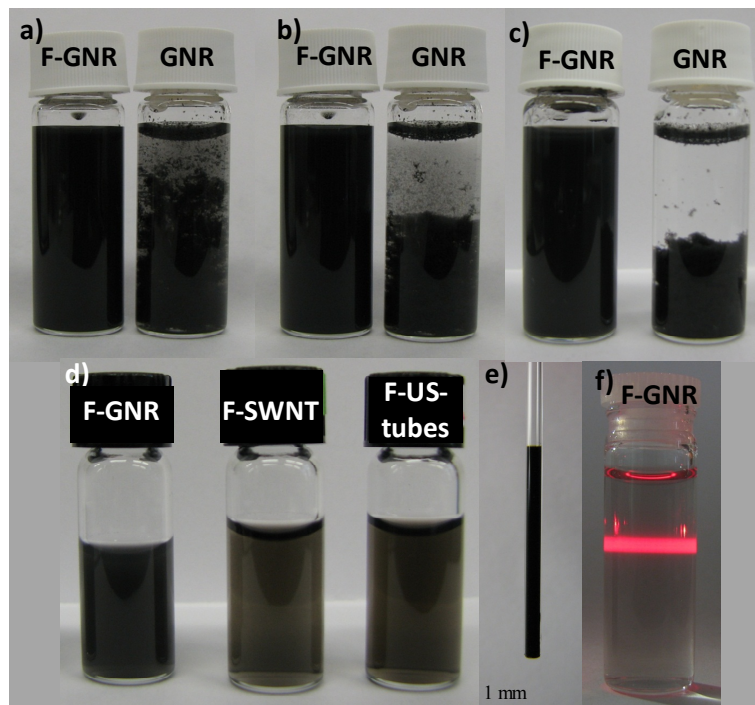


Fig. S1 Aqueous colloidal solutions of functionalized GNRs (F-GNRs) at 2 mg/ml *versus* GNRs at 2 mg/ml a) 15 min after sonication, b) 3 h after sonication, c) 1 month after sonication, d) aqueous colloidal solutions of F-GNR, functionalized SWNT (F-SWNT), and F-US-tubes at 0.1 mg/ml, where the F-GNR solution appears darker compared to the F-SWNT and F-US-tube solutions due to the larger size of the F-GNR particles, e) aqueous solution of the F-US-tubes at 14 mg/ml, f) Tyndall effect (with 640-660 nm laser beam and maximum output of >1 mW) demonstrating a fine suspension of the F-GNRs in water.

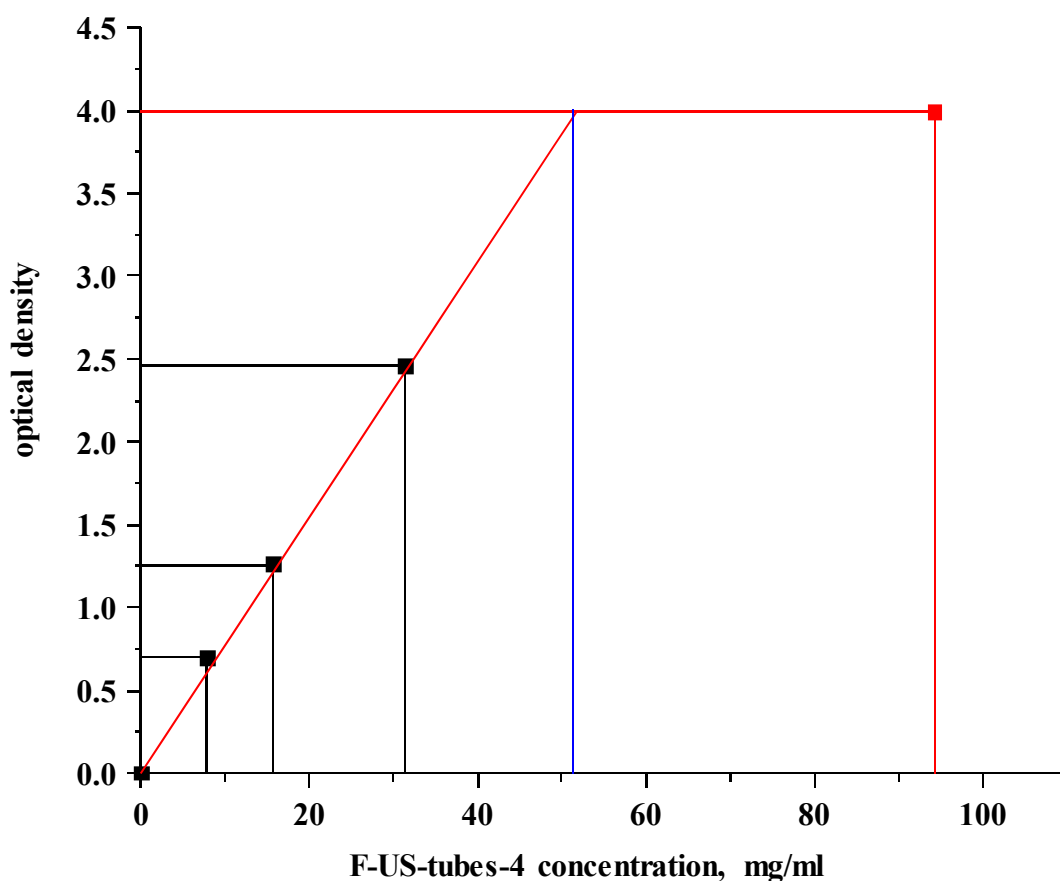


Fig. S2 A Beer's Law plot for an aqueous solution of F-US-tubes-4 at 928 nm with a light path length of 0.05 mm. Solubility of F-US-tubes-4 determined as described in Ref. 1. The solubilities of F-GNR-4 and F-SWNT-4 were estimated as described in Ref. 2 by dispersing excessive amounts (12 mg) of the nanomaterial in 2 ml water. The resulting dispersions were left to stand for 5 hours and 400 μ l of each was carefully taken from the upper part of the solution with a micropipette and evaporated in high vacuum at -50 $^{\circ}$ C. The residues were then weighed, from which the concentrations for F-GNRs-4 and F-SWNTs-4 were calculated as 4.7 mg/ml and 4.8 mg/ml, respectively.

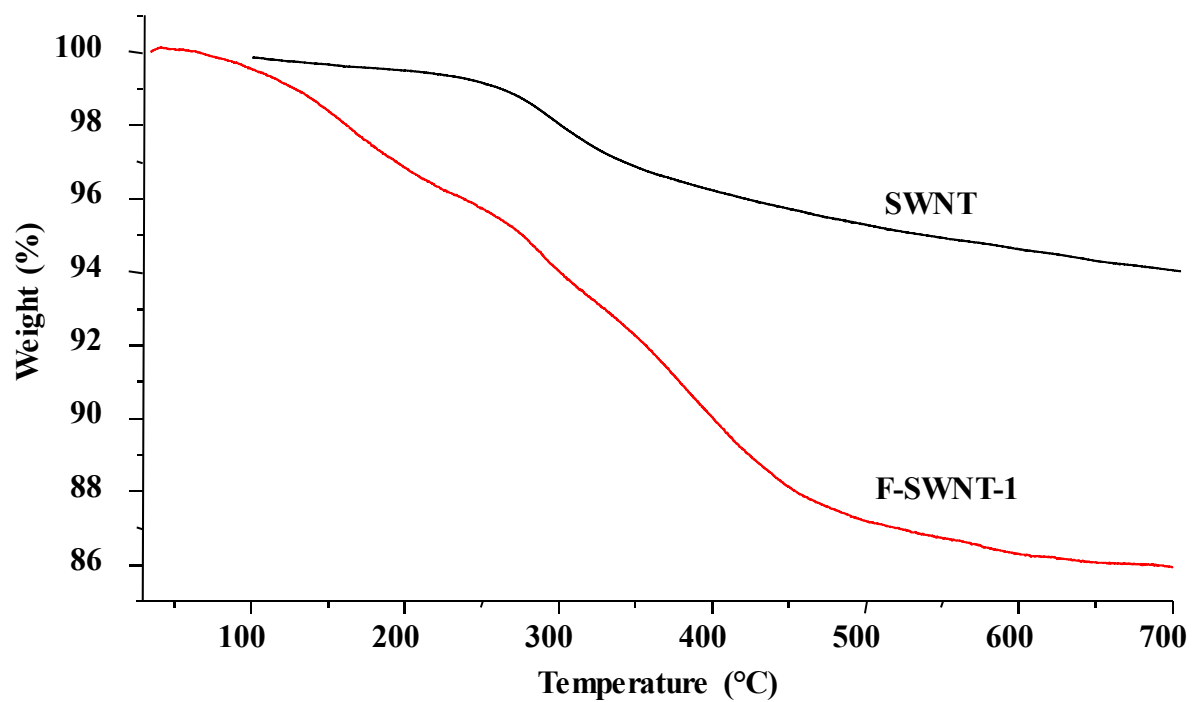


Fig. S3 TGA traces of the SWNTs and F-SWNT-1 (functionalized 1 time) in an Ar atmosphere at a 10 °C/min scan rate from RT to 700 °C.

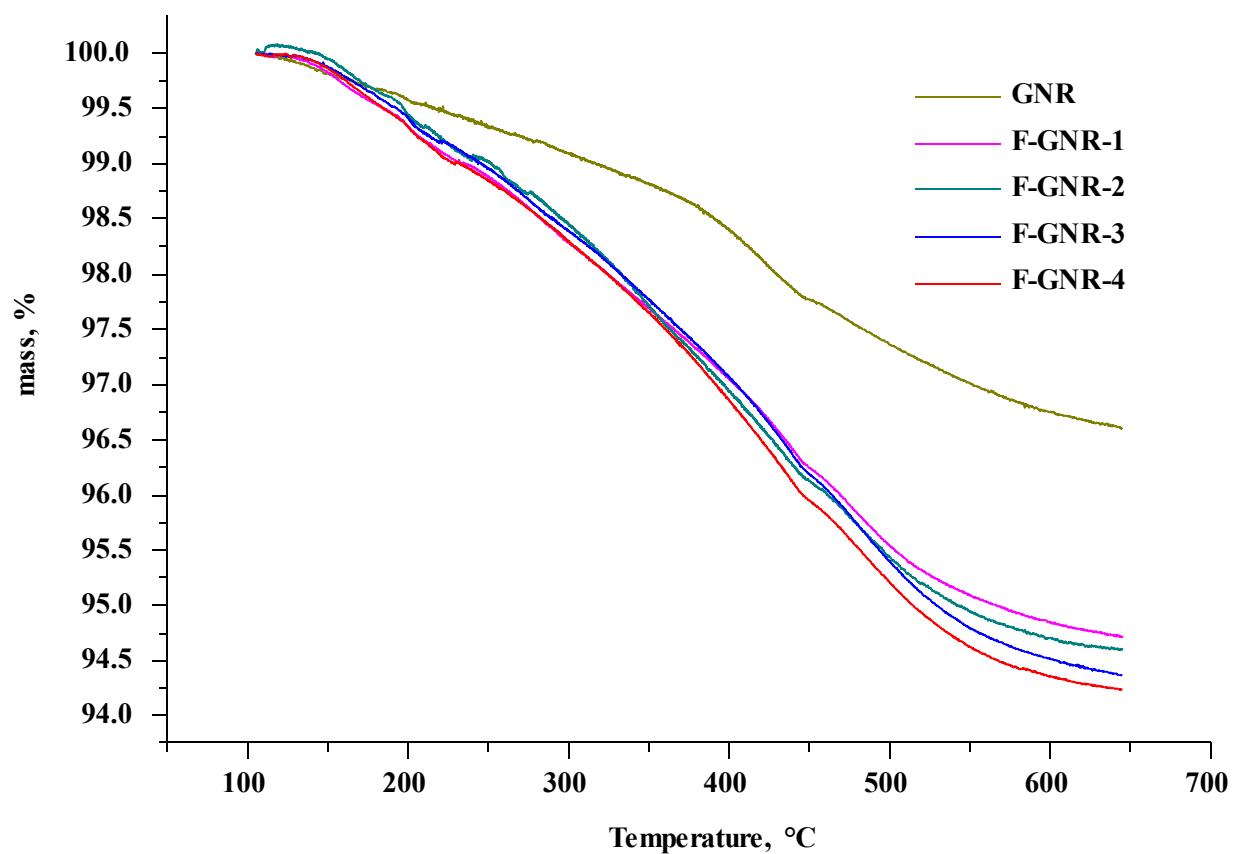


Fig. S4 TGA traces for the GNRs and F-GNRs 1-4 (F-GNRs functionalized repeatedly 1-4 times) in an Ar atmosphere at a 10 °C/min scan rate from 100 to 650 °C.

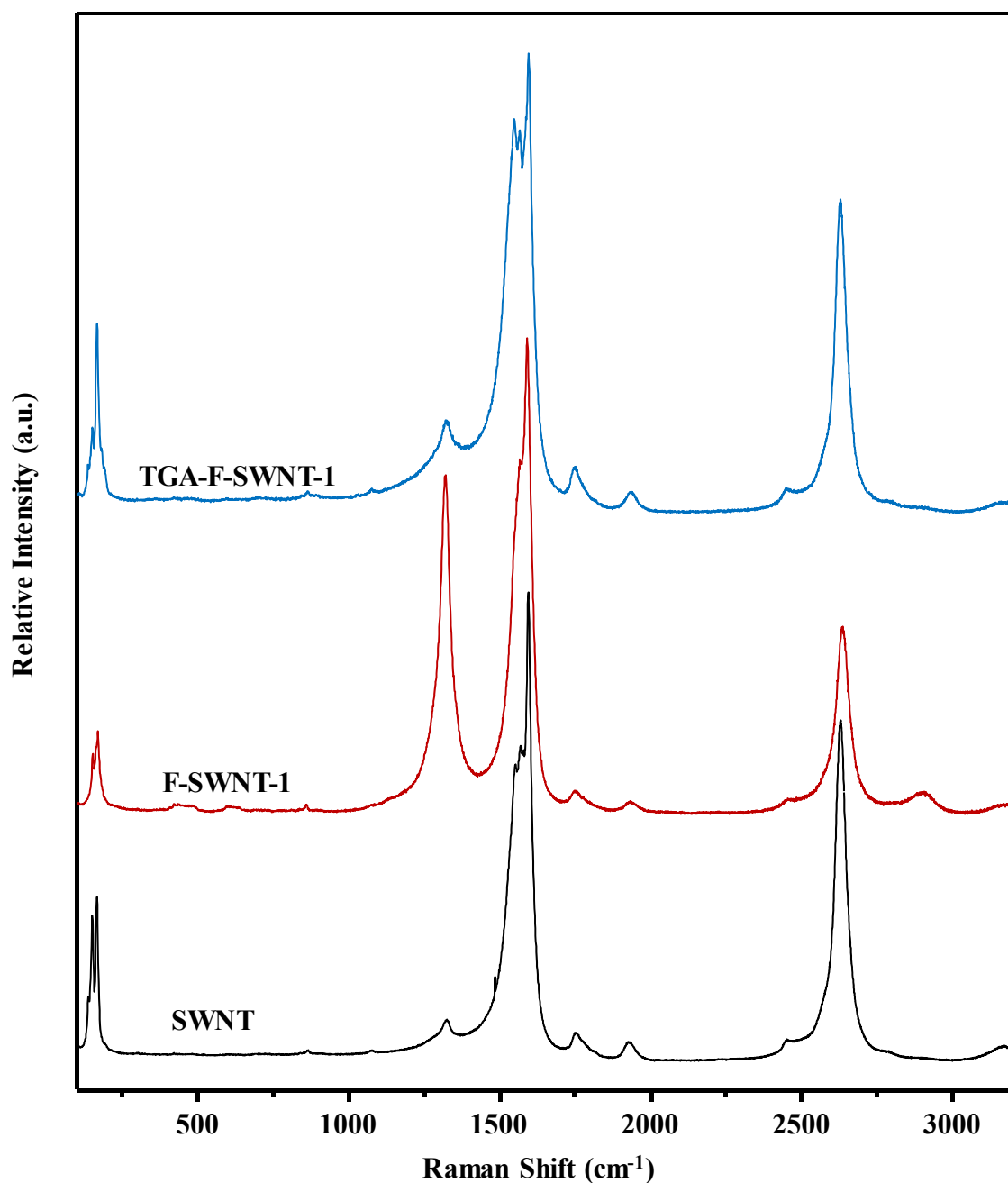


Fig. S5 Raman spectra (633 nm excitation) of SWNT, F-SWNT and TGA-F-SWNT-1 from Fig. S2 after heating to >700 °C in the TGA experiment. Increase in intensity of the disorder mode (1314 cm⁻¹) for the F-SWNT spectrum indicates increased number of sp³ carbons then comparing to SWNTs, hence formation of covalent bond. TGA-F-SWNT-1 spectrum as a result of decomposition of covalently-attached moieties and restoration of the sp² structure of the initial material.

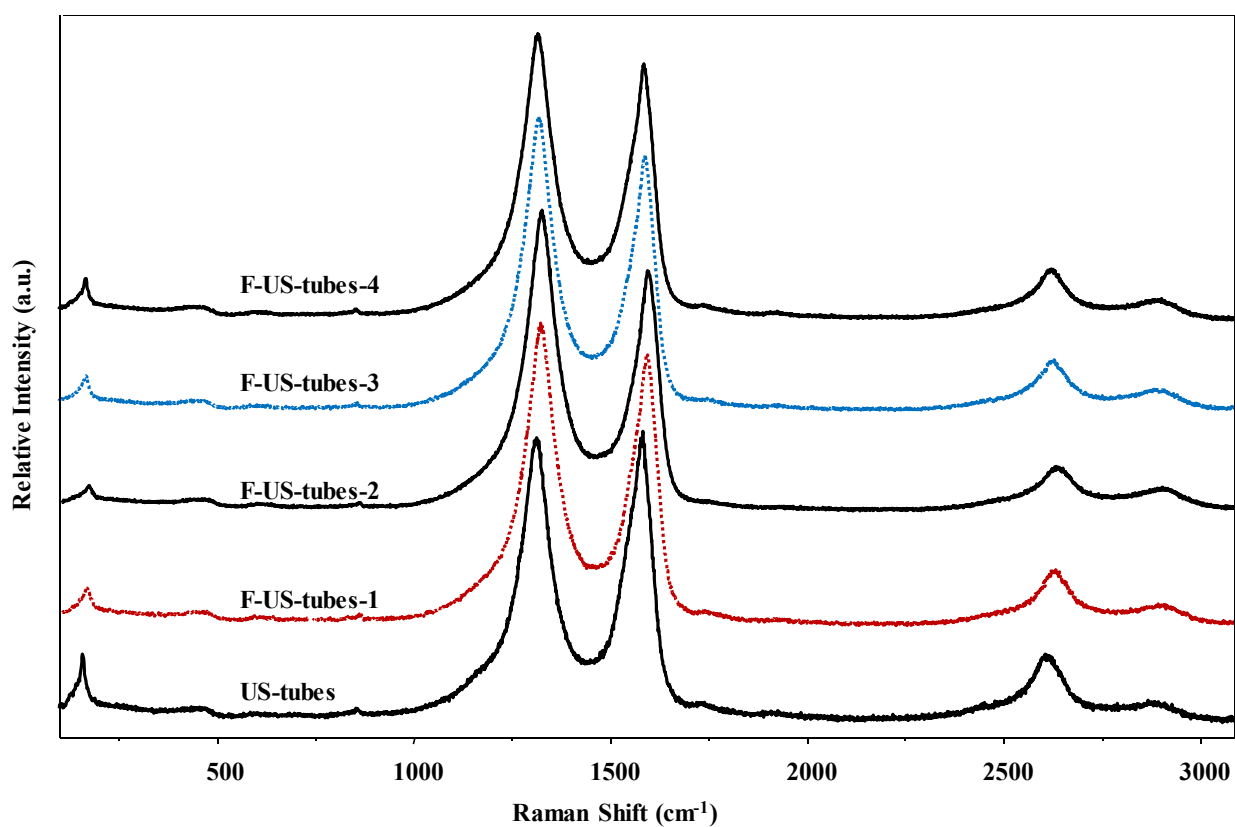


Fig. S6 Raman spectra (633 nm excitation) of US-tubes, F-US-tubes-1, F-US-tubes-2, F-US-tubes-3, and F-US-tubes-4.

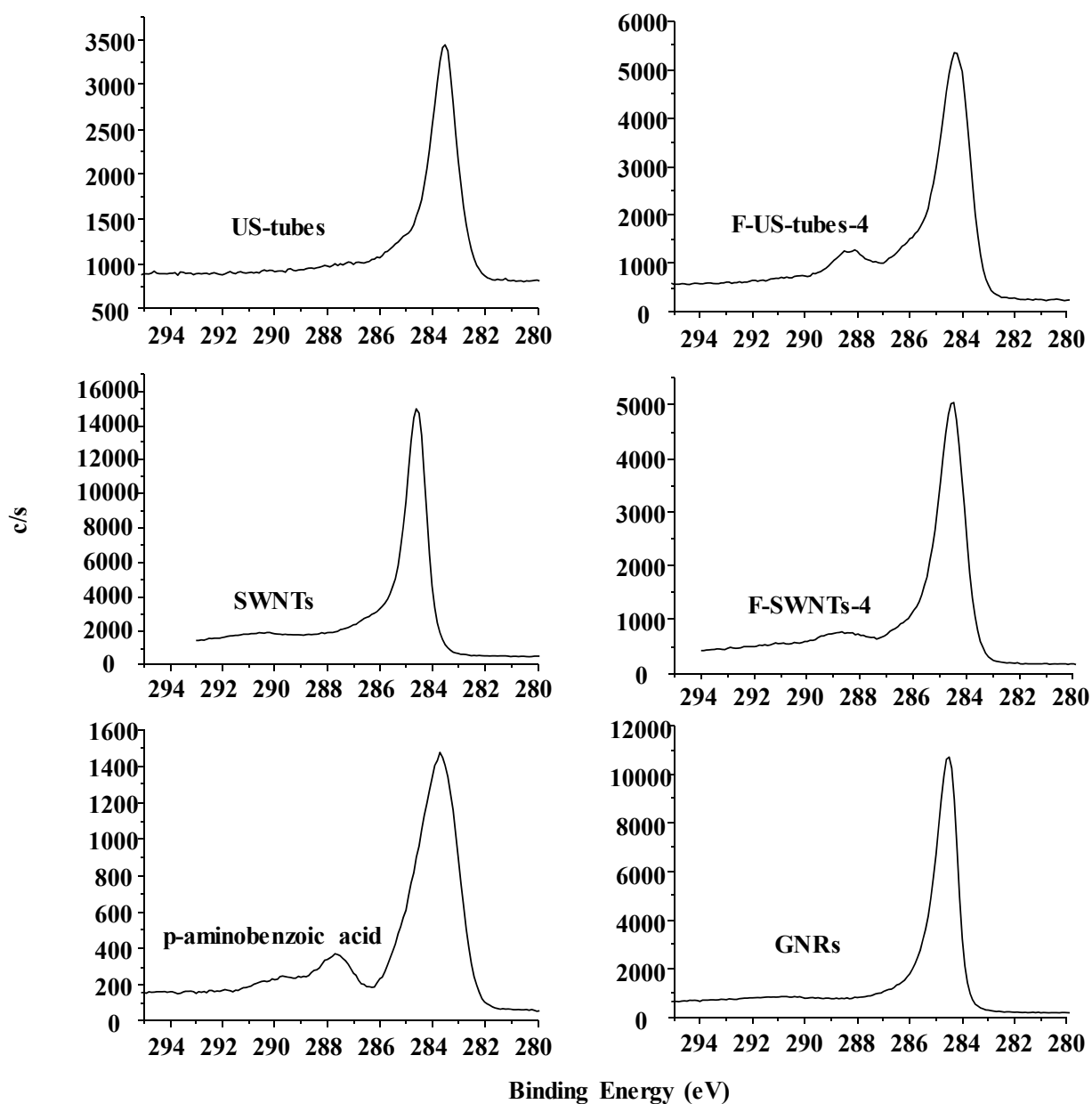


Fig. S7 XPS of C1s for US-tubes, SWNTs, GNRs, F-US-tubes-4, F-SWNTs-4, and *p*-aminobenzoic acid.

References

- 1 J. M. Ashcroft, K. B. Hartman, Y. Mackeyev, C. Hofmann, S. Pheasant, L. B. Alemany and L. J. Wilson, *Nanotechnology*, 2006, **17**, 5033.
- 2 H. Leinonen, M. Pettersson, M. Lajunen, *Carbon*, 2011, **49**, 1299.