Supporting Information

Functionalization of Carbon and Gold Nanomaterials Using PNIPAAm Grafted Dextran: A General Route Towards Robust and Smart Nanomaterials*

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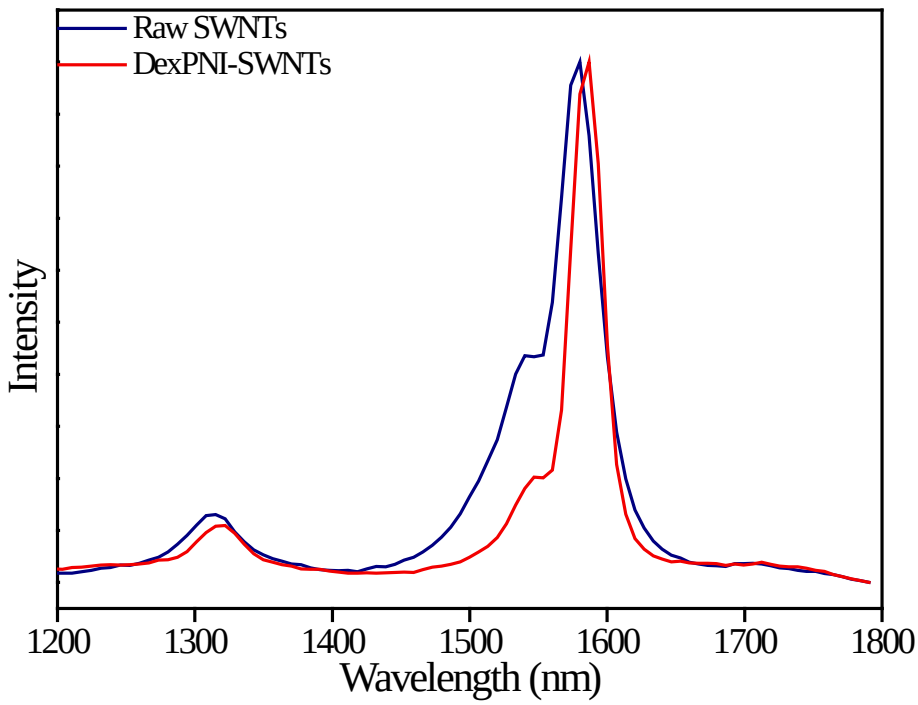

Figure S1. Typical Raman spectra of HiPco SWNT before (blue) and after (red) DexPNI functionalization.

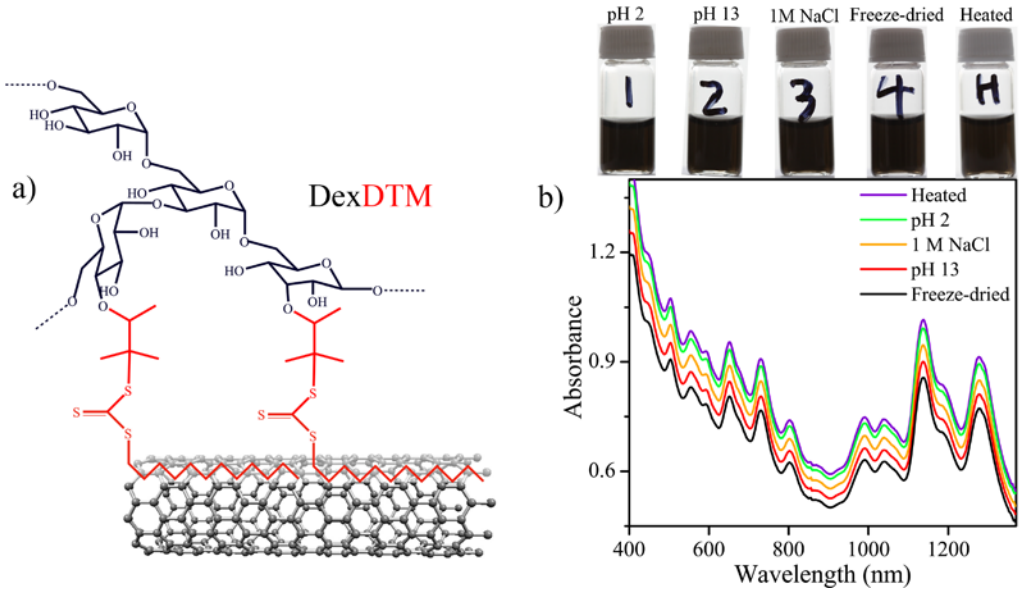

Figure S2.SWNT functionalized by non-smart dextran-based macro chain transfer agent (DexDTM). a) Schematic illustration of SWNT functionalization using 2-(dodecylthiocarbonothioylthio)-2-methyl-propanoic acid (DTM) esterificated dextran (DexDTM). DexDTM are tightly anchored on SWNT surfaces by noncovalent interactions between dodecyl groups and SWNT. b) Pictures (top panel) and UV-vis-NIR spectra of DexDTM functionalized SWNT at various conditions. Similar with DexPNI-SWNT, DexDTM-SWNT exhibit excellent stability after incubation at pH 2 to 13 for 4 weeks, and 1M NaCl for 1 week, as well as after sonication-assisted redispersion of freeze-dried sample. Although DexPNI-SWNT suspension starts to aggregate upon heating/NIR irradiation, hence is “unstable” against heating due to LCST phase transition of PNIPAAm, the fact that DexDTM-SWNT suspension can be stably suspended without aggregation after heating at 80 °C for 12 hr proves our dextran-based polymers are able to tightly attached on SWNT to provide a stable coating against extreme pH, high salt concentration and heating.

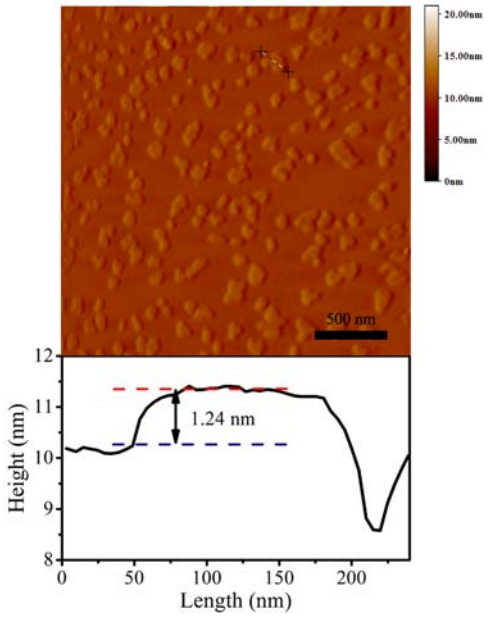

Figure S3. AFM image of NGO prepared by tip-sonication of GO solution (1 mg/ml). The thickness of NGO is 1~2 nm, characteristic of single- or few-layered NGO.

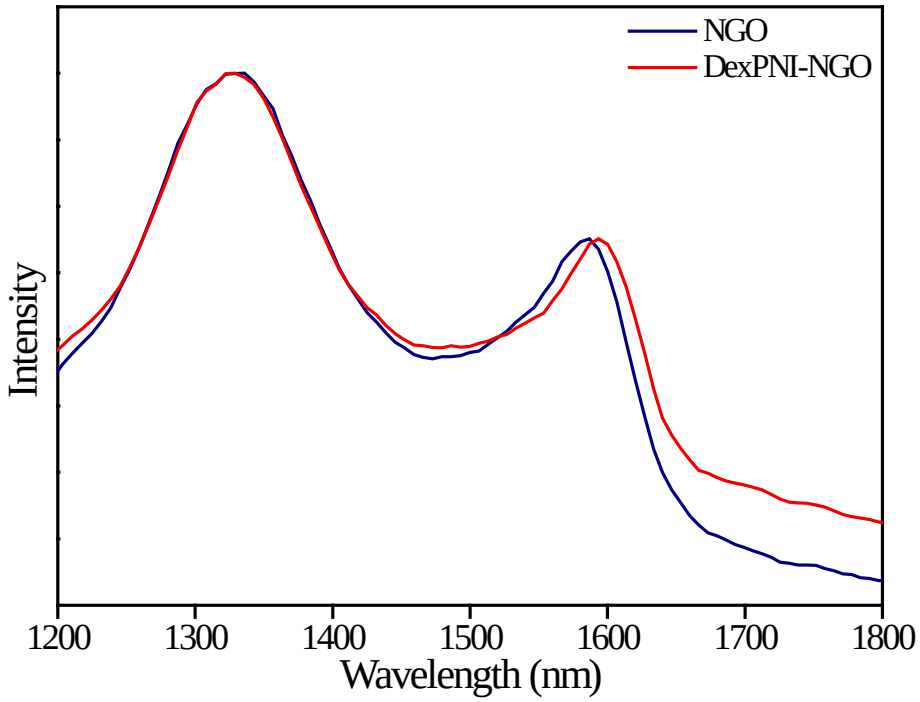

Figure S4. Typical Raman spectra of NGO before (blue) and after (red) DexPNI functionalization.

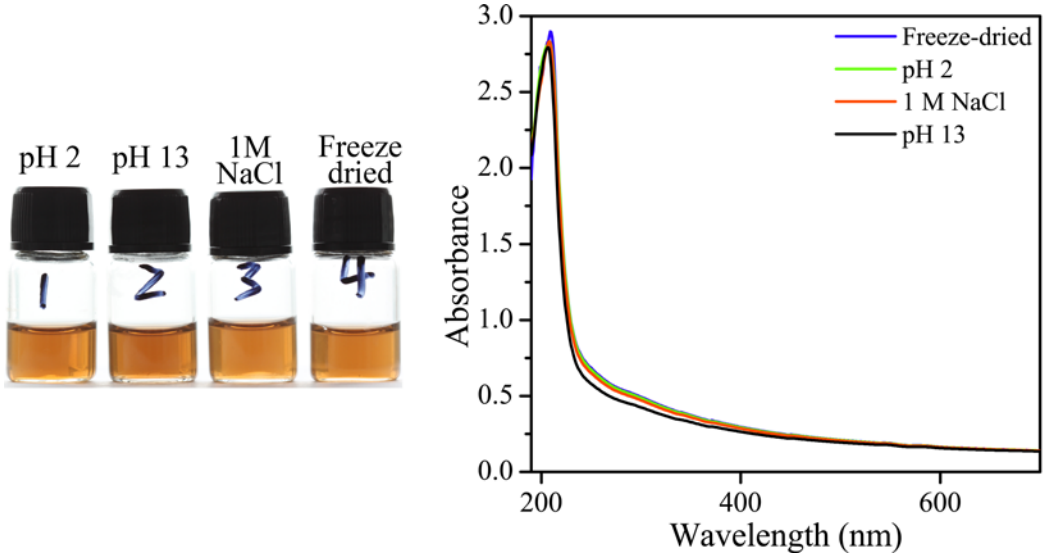

Figure S5. Pictures and UV-vis spectra of DexPNI functionalized NGO at various conditions as stability demonstration. Incubation at pH 2 (black) and 13 (green) for 4 weeks, 1 M NaCl (pH=8, red) for 1 week, and sonication-free redispersion of freeze-dried sample (blue) have imperceptible influence on the NGO dispersity or UV-vis absorbance.

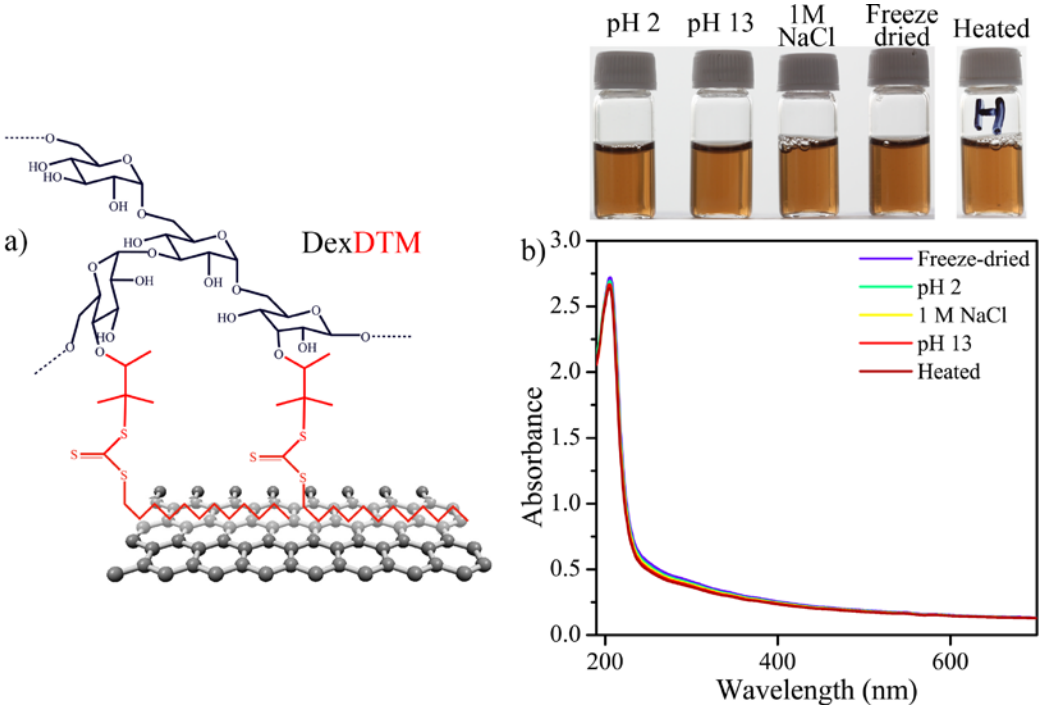

Figure S6. NGO functionalized by non-smart dextran-based macro chain transfer agent (DexDTM). a) Schematic illustration of NGO functionalization using DexDTM, which are tightly anchored on NGO by noncovalent interactions between dodecyl groups and NGO. b) Pictures (top panel) and UV-vis spectra of DexDTM functionalized NGO at various conditions. Similar with DexPNI-NGO, DexDTM-NGO exhibit excellent stability after incubation at pH 2 to 13 for 4 weeks, and 1M NaCl for 1 week, as well as after sonication-free redispersion of freeze-dried sample. Although DexPNI-NGO suspension starts to aggregate

upon heating/NIR irradiation, hence is "unstable" against heating due to LCST phase transition of PNIPAAm, the fact that DexDTM-NGO suspension can be stably suspended without aggregation after heating at 80 °C for 12 hr proves that our dextran-based polymers are able to tightly attached on NGO to provide a stable coating against extreme pH, high salt concentration and heating.

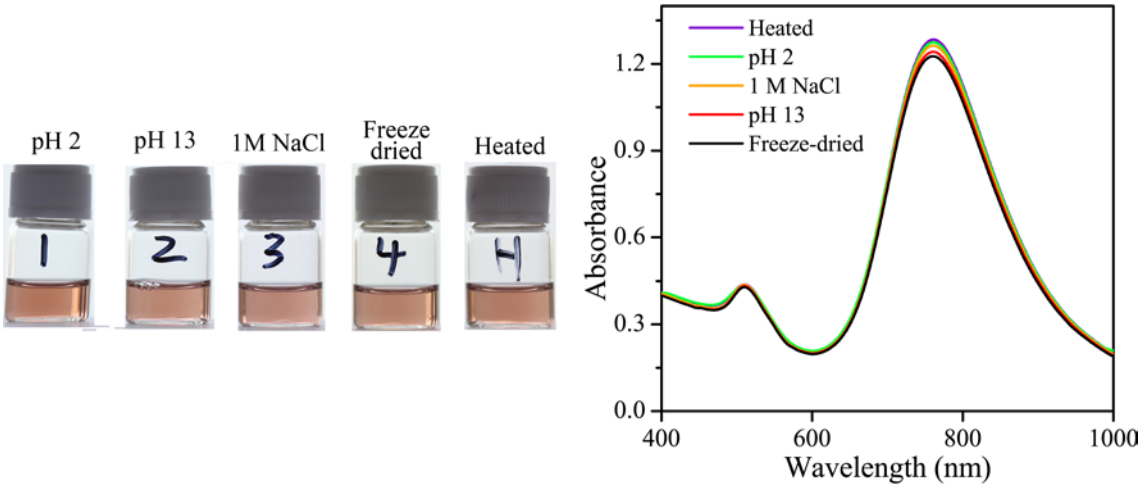

Figure S7. Stability demonstration of AuNR-SH-DexPNI. No sedimentation of AuNR is observed and characterstic SPR band of AuNR is preserved after incubation at pH 2 and 13 for 4 weeks, 1 M NaCl for 1 week. Neither redispersion of freeze-dried sample nor heating the solution at 70 °C for 12 h changs the UV-Vis spectrum (measured at 25 °C) and well-suspended state of AuNR.

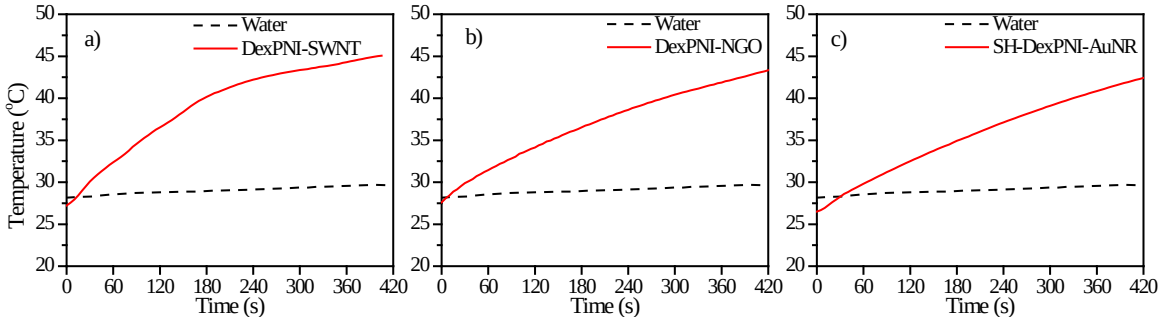

Figure S8. Temperature evolution of a) DexPNI-SWNT, b) DexPNI-NGO and c) SH-DexPNI-AuNR solution upon 808 nm laser irridiation (power density=1.5 W/cm^2). Water (dash lines) is used as control and nearly no temperature change can be observed for pure water comparing to the rapid raise of temperature for NIR-sensitive solutions.