Supporting Information

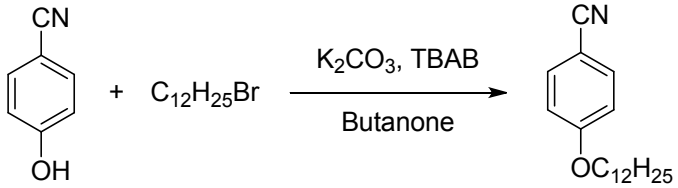
Materials

Graphene were purchased from Xiamen Knano Graphene Technology Corp., Ltd, China. Ferric perchlorate hydrate (reagent grade) was purchased from Alfa Aesar. The rest of reagents mentioned were purchased from J&K and were used without further purification, unless otherwise stated.

Instruments

Raman measurements were performed at room temperature with a HORIBA Jobin Yvon LabRam-1B at 633 nm laser excitation. X-ray photoelectron spectroscopy (XPS) analysis was carried out on a Perkin Elmer PHI 5000C ESCA instrument. Thermal gravimetric analysis (TGA) was measured under an N_2 atmosphere to 600 °C with a Perkin Elmer Pyris 1 TGA at a heating rate of 20 °C min^{-1}. Atomic force microscope (AFM) images were obtained by using Bruker Multimode 8 with tapping mode.

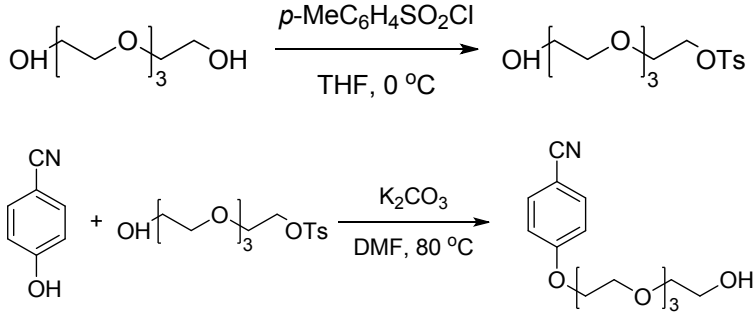
Synthesis of 4-(dodecyloxy)benzonitrile 3[1]



3

The experiment was performed in a 500 mL round-bottom flask equipped with magnetic stirrer and condenser. 4-Hydroxybenzonitrile (15.00 g, 126.0 mmol), 1-bromododecane (42.30 mL, 176.0 mmol) and K_2CO_3 (52.20 g, 378.0 mmol) were dissolved in 350 mL of butanone. The mixture was then refluxed and stirred for 24 h. After the reaction, the suspension was filtered and the cake was washed with hot butanone. After the solvent was evaporated from the collected butanone solution, a solid was obtained and recrystallized from ethanol. White crystals. Yield: 87% (31.51 g). ^{1}H NMR (500 MHz, $CDCl_3$): δ = 7.56 (d, 2H, Ar-H), 6.92 (d, 2H, Ar-H), 3.99 (t, 2H, -OCH_2-), 1.79 (qt, 2H, -OCH_2CH_2-), 1.45 (m, 2H, -CH_2-), 1.38 - 1.26 (br, 16H, -CH_2-), 0.88 (t, 3H, -CH_3) ppm.

Synthesis of 4-(2-(2-(2-(2-hydroxyethoxy)ethoxy)ethoxy)ethoxy)benzonitrile 4[2]



4

2-(2-(2-(2-Hydroxyethoxy)ethoxy)ethoxy)ethyl 4-methylbenzenesulfonate. The experiment was performed in a 100 mL round-bottom flask equipped with magnetic stirrer and condenser. Tetraethyleneglycol (22 mL, 0.125 mol) was dissolved in 8 mL of dry THF and then mixed with an aqueous solution of sodium hydroxide (1 g, 25.18 mmol, 6.0 mL). A solution of *p*-toluene sulfonylchloride (3 g, 15.73 mmol) in dry THF (20 mL) was added dropwise. The reaction mixture was stirred vigorously at 0 °C for 2 h. After addition of cooled water (90 mL), the mixture was extracted by $CHCl_3$ (3×50 mL). The combined organic phases were dried over MgSO4, filtered and concentrated under reduced pressure. The colorless oil was dried in a vacuum oven. Yield: 91% (4.98 g). ^{1}H NMR (500 MHz, $CDCl_3$): δ = 7.79 (d, 2H, Ar-H), 7.33 (d, 2H, Ar-H), 4.16 (t, 2H, -SO_3CH_2-), 3.72 - 3.56 (m, 14H), 2.45 (s, 3H, -CH_3) ppm.

4-(2-(2-(2-(2-Hydroxyethoxy)ethoxy)ethoxy)ethoxy)benzonitrile **4**. The synthesis was conducted in a 50 mL two-necked round-bottom flask equipped with magnetic stirrer and condenser. 2-(2-(2-(2-Hydroxyethoxy)ethoxy)ethoxy)ethyl 4-methylbenzenesulfonate (3.03 g, 8.65 mmol), K_2CO_3 (1.98 g, 12.97 mmol) and 4-hydroxybenzonitrile (1.13 g, 9.51 mmol) were mixed in 15 mL of dry DMF. The reaction mixture was stirred vigorously at 80 °C for 48 h. After cooling down to room temperature, the solvent was removed by rotary evaporator. After addition of cooled water (50 mL), the mixture was extracted by CH_2Cl_2 (2×100 mL). The combined organic phases were dried over $MgSO_4$, filtered and concentrated under reduced pressure. The residue was purified by flash chromatography on silica gel. Colorless oil. Yield: 54% (1.38 g). ^{1}H NMR (500 MHz, $CDCl_3$): δ = 7.57 (d, 2H, Ar-H), 6.96 (d, 2H, Ar-H), 4.17 (t, 2H), 3.86 (t, 2H), 3.73-3.67 (m, 12H) ppm.

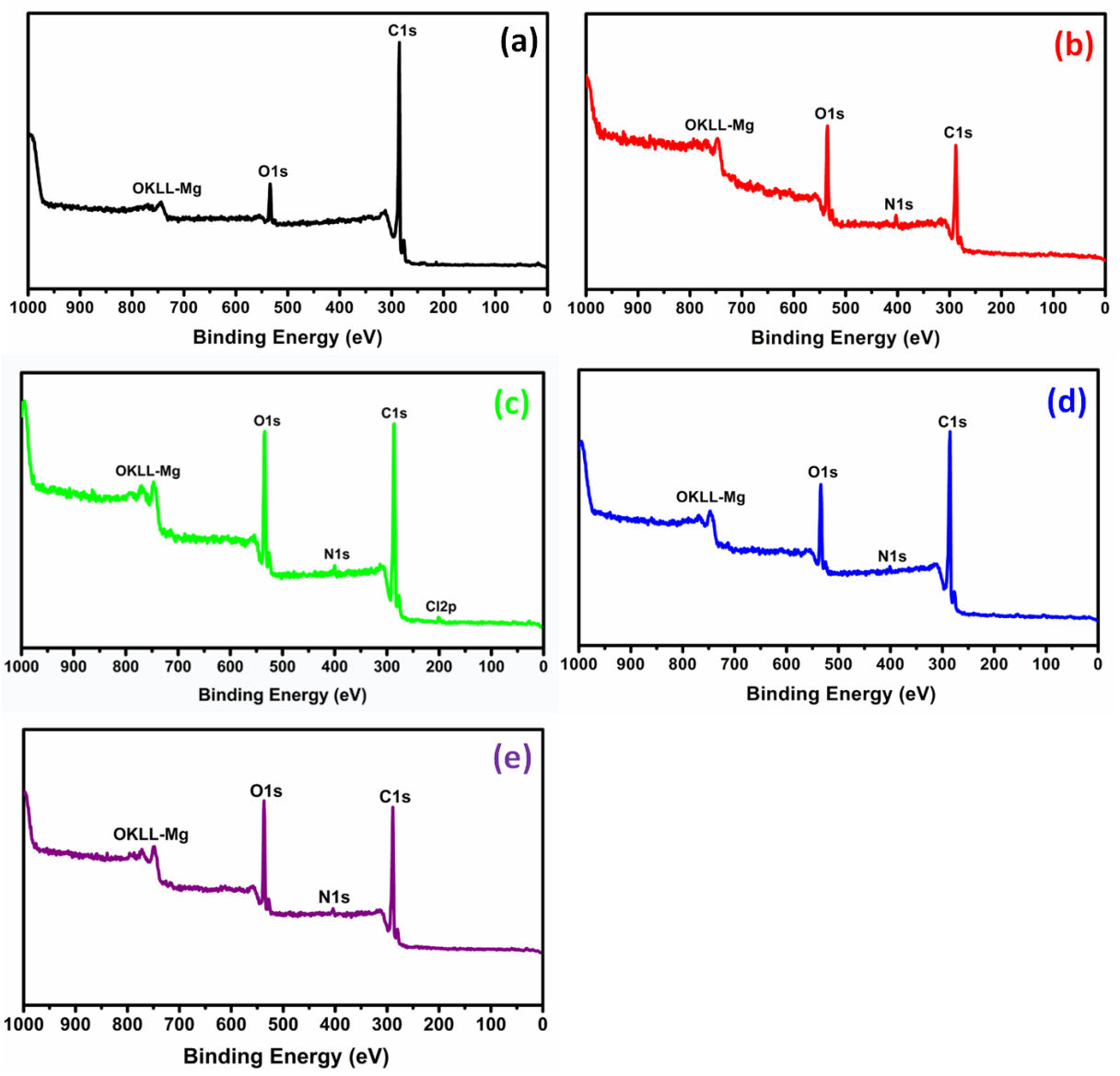


Fig. S1 Full XPS spectra of (a) pristine graphene (b) FG-1, (c) FG-2, (d) FG-3, (e) FG-4 showing the presence of C, O, and N.

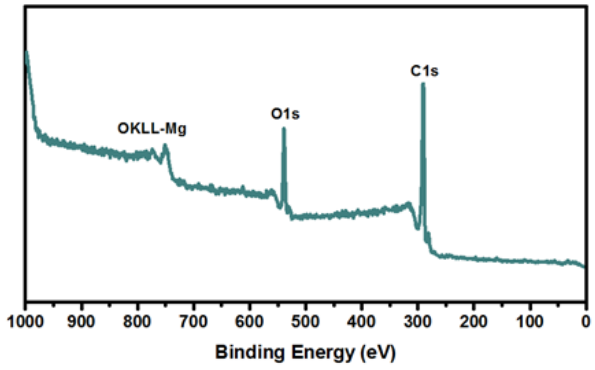


Fig. S2 Full XPS spectra of graphene after heating with 4-nitrobenzonitrile in the presence of ferric perchlorate hydrate.

Reference

(1) G. Burgy, T. Tahtouh, E. Durieu, B. Josselin-Foll, E. Limanton, L. Meijer, and F. Carreaux, *Eur. J. Med. Chem.,* **2013,** 728–737.

(2) H. Gallardo, M. Ferreira, A. A. Vieira, E. Westphal, F. Molin, J. Eccher, and I. H. Bechtold, *Tetrahedron,* **2011,** 9491−9499.