Supporting Information to

Smart Graphene Dispersion Stabilized by a CO₂-Removable Polymer

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1. Characterization of compounds and polymers



Fig. S1 ¹H NMR spectrum of ANME in CDCl₃



Fig. S2 ¹³C NMR spectrum of ANME in CDCl₃



Fig. S3 ESI-HRMS spectrum of ANME



Fig. S4 IR spectrum of ANME



Fig. S5 ¹H NMR spectrum of PEO-Br in CDCl₃



Fig. S6 IR spectrum of PEO-Br



Fig. S7 ¹H NMR spectrum of PEO-*b*-PMASI in CDCl₃



Fig. S8 IR spectrum of PEO-b-PMASI



Fig. S9 ¹H NMR spectrum of PEO-*b*-PANME in CDCl₃



Fig. S10 IR spectrum of PEO-b-PANME

2. Conductivity measurement

The conductivity (κ) of 1.0 mg·mL⁻¹ PEA aqueous solution was recorded with an EF30 conductometer (Mettler Toledo, USA) at 25 °C while bubbling CO₂ or N₂ through a syringe needle with inner diameter of 1.5 mm. The flow rate of CO₂ and N₂ was fixed at 3 and 15 mL·min⁻¹, respectively.

3. Monitoring of pH Value

The variation of pH value of 1 mg·mL⁻¹ PEA aqueous solutions under CO₂ or N₂ bubbling was continuously monitored at 25 °C with a Sartorius basic pH-meter PB-10 (\pm 0.01) calibrated with standard buffer solutions. The flow rate of CO₂ and N₂ was fix at the same value stated above.

4. Determination of pK_{aH} value

The p K_{aH} (p K_a of the protonated species) value of PEA was determined by titrating 20 mL of 0.25 mg·mL⁻¹ aqueous solutions with 2 mM hydrochloric acid, and the pH was continuously monitored at 25 °C with the same pH meter mentioned above. The p K_{aH} values were obtained by taking the pH readings at the mid-point between two pH jumps.¹

5. Dialysis experiment

In order to directly "see" the CO₂-induced release of PEA from PEA-rGO complex, a comparison dialysis experiment was designed and performed. The procedure is as follows: 20 mg rGO was added into 20 mL PEA aqueous solution (10 mg·mL⁻¹) followed by ultrasonication for 90 min. The suspension was then filtered through a PTFE micro-porous membrane (0.22 μ m), and the hybrids left on the membrane was collected and redispersed in 20 mL deionized water with the assistance of sonication for 5 min. The dispersion was divided into two equal parts, while one part treated with CO₂, the other one without any treatment. Then the two dispersion were dialyzed against 250 mL deionized water,

respectively. The absorbance at 215 nm of the water was recorded at given intervals for the purpose to compare the release rate and amount of PEA from the two dispersion.

6. Examination of graphene content in dispersion

To determine the graphene concentration based on UV-vis absorption, the absorption coefficient (α) of PEA-rGO dispersion should be obtained. For this purpose, several dispersion with known graphene concentration were prepared and their absorbance at 660 nm were then recorded. The absorbance divided by cell length is plotted versus concentration, showing lambert-Beer behavior with absorption coefficient (α) of 3,660 mL·mg⁻¹·m⁻¹. Then graphene concentration stabilized by different concentration of PEA aqueous solution was examined. PEA solution with different concentration was mixed with rGO powder (fixed at 1 mg·mL⁻¹) followed by sonication for 90 min and centrifugation at 1,500 rpm for 10 min. Then the final dispersion was collected from the supernatant and determined from its UV-vis spectra according to absorbance value and the absorption coefficient at a wavelength 660 nm.

References

(1) Zhang, Y.; Feng, Y.; Wang, J.; He, S.; Guo, Z.; Chu, Z.; Dreiss, C. CO₂-switchable wormlike micelles. *Chem. Commun.* **2013**, *49*, 4902–4904.