Supporting Information

A Novel Amphiphilic Double-[60]Fullerene-Capped Triblock Copolymer

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Supporting Information

1. Characterization

FT-IR spectra were recorded on a Perkin-Elmer FT-IR spectrometer. Thermogravimetric measurements were conducted with a Perkin-Elmer Pyris 1 TGA Thermogravimetric Analyzer. A HP8453 UV-visible spectrophotometer equipped with a HP89090A temperature control unit was used for UV-visible absorption measurements at different temperatures. $^1$H NMR spectra were recorded on a Bruker DRX 400 instrument in CDCl$_3$. Surface tension measurement was conducted using a KRUSS Tensiometer K100 via ring method. Atomic force microscopy (AFM) images were recorded using a Digital Instruments (Santa Babara, California) Dimension 3000 atomic force microscope under ambient condition. It was operated in the tapping mode with an optical readout using Si cantilevers. The samples were prepared by dropping the aqueous solution onto the glass plate followed by drying under ambient conditions. Transmission electron microscopy (TEM) was performed on a JEOL JEM2010 operating at an acceleration voltage of 200 kV. For the observation of size and distribution of aggregates, a drop of dilute aqueous solution (0.84 mg ml$^{-1}$) was placed onto a 200 mesh copper grid coated with carbon. The samples were dried at ambient conditions before measurements.

*Laser Light Scattering (LLS) Measurements*

A Brookhaven laser light scattering system was used. The system consists of a BI-200SM goniometer, a BI-9000AT digital correlator, and other supporting data acquisition and analysis software and accessories. An argon ion vertically polarized 488 nm laser was used as the light source. The temperature was controlled at 25 ± 0.1 °C using a
Science/Electronic water bath. The concentration range of the polymer solutions was 0.22 ~ 0.98 mg ml\(^{-1}\), which is in the dilute solution regime where the behavior of individual particles can be characterized.

**Gel Permeation Chromatography (GPC)**

The molecular weight and molecular weight distribution of polymers were determined by gel permeation chromatography (GPC). An Agilent 1100 series GPC system equipped with a LC pump, Plgel 5 \(\mu\)m MIXED-C column, and a RI detector was used. The column was calibrated with narrow molecular weight distribution polystyrene standards. HPLC grade THF stabilized with 2, 6-di-\textit{tert}-butyl-4-methylphenol (BHT) was used as a mobile phase. The flow rate was maintained at 1.0 ml/min. The reflective index (RI) detector and column were thermostated at 25 °C.

2. **Zimm plot relationship**

\[
\frac{KC}{R_\theta} = \frac{1}{M_w} \left[ 1 + \frac{16\pi^2 n^2 \left\langle R_g^2 \right\rangle \sin^2 \left( \frac{\theta}{2} \right)}{3\lambda^2} \right] + 2A_C C
\]

where the Rayleigh ratio, \(R_\theta = (I_r/\sin\theta)\); \(K = [4\pi^2 n^2(\partial n/\partial C)^2/(N_A \lambda^4)]\); \(C\) is the concentration of the polymer solution; \(n\) is the refractive index of the solvent; \(\theta\) is the angle of measurement; \(\lambda\) is the wavelength of laser light; \(N_A\) is Avogadro’s constant; and \((\partial n/\partial C)\) is the refractive index increment of the polymer solution. A plot of \((KC/R_\theta)\) versus \([\sin^2(\theta/2) + kC]\) (where \(k\) is a plotting constant) can be used to determine the molecular parameters. By extrapolating the data to zero angle and concentration, \(R_g\) and
$A_2$ can be obtained from the respective slopes, and the intercepts yield the inverse of the $M_w$.

3. **Figures**

**Captions of Figures**

**Figure S1**  GPC curves of (a) PEO, (f) at various reaction time: (b) 35 min; (c) 3 h and (d) 3.5 h, and (e) IV.

**Figure S2**  IR spectra of (a) N$_3$-DMAEMA$_{60}$-b-EO$_{105}$-b-DMAEMA$_{60}$-N$_3$, (b) IV.

**Figure S3**  UV-vis spectra of (a) IV in 2 mg ml$^{-1}$ aqueous solution of IV, (b) 1 mg ml$^{-1}$ THF solution of IV, and (c) 2 mg ml$^{-1}$ aqueous solution of II.

**Figure S4**  GPC curves of IV under same experiment conditions using RI and UV detectors.

**Figure S5**  TGA thermograms of (a) PEO, (b) poly(DMAEMA)$_{125}$, (c) II and (d) IV.

**Figure S6**  Plot of surface tension versus concentration of IV in aqueous solution at 25 °C.

**Figure S7**  Decay time distribution function at different scattering angles for 0.63 mg ml$^{-1}$ of IV in aqueous solution at 25 °C.

**Figure S8**  Plot of $\Gamma$ versus $q^2$ for 0.63 mg ml$^{-1}$ aqueous solution of IV at 25 °C.

**Figure S9**  Plot of D versus concentration of IV in aqueous solution at 25 °C.

**Figure S10**  Zimm plot for IV in aqueous solution at 25 °C.

**Figure S11**  AFM micrograph obtained from 0.84 mg ml$^{-1}$ aqueous solution of IV.

**Figure S12**  TEM micrograph obtained from 0.84 mg ml$^{-1}$ aqueous solution of IV.
Figure S1

Figure S2
Figure S3

Figure S4
Figure S5

Figure S6
Figure S7

Figure S8
Figure S9

\[ D \times 10^{12} \text{ (m}^2\text{s}^{-1}) \]

Figure S10

\[ \sin^2(\theta/2) + 5180 C \]

\[ [K_C \times 10^6/R_{\alpha}] \text{ mol g}^{-1} \]
Figure S11

Figure S12