Fig. S1 (a) MALDI-TOF mass spectrum of Y<sup>3+</sup>-PyrHA in methanol and (b) the composition of proposed fragments
Fig. S2 Fluorescence spectra of (a) Y$_3^{3+}$-PyrHA, (b) MMC$_{60}$ and (c) Y$_3^{3+}$-PyrHA/MMC$_{60}$ in DMSO-toluene (4/1, v/v) ($\lambda_{\text{ex}} = 320$ nm). [Y$_3^{3+}$-PyrHA] = [MMC$_{60}$] = 10 μM.

Fig. S3 The hydrodynamic radius (Rh) and polydispersity index (PDI) for Y$_3^{3+}$-PyrHA/MMC$_{60}$ and Y$_3^{3+}$-PyrHA/MMC$_{70}$ in buffer solution (HEPES, 10 mM, pH 7.4) containing 1% P123. [MMC$_{70}$] = [MMC$_{60}$] = [Y$_3^{3+}$-PyrHA] = 20 μM.
Fig. S4 (a) Transient absorption spectra of MMC<sub>60</sub> (20 μM) observed by 355 nm laser irradiation in Ar-saturated 1% P123 buffer solution (HEPES, 10 mM, pH 7.4). (b) Time profiles of MMC<sub>60</sub> at 720 nm in the absence and presence of Y<sup>3+</sup>-PyrHA in 1% P123 buffer solution (HEPES, 10 mM, pH 7.4). [Y<sup>3+</sup>-PyrHA] = [MMC<sub>60</sub>] = 40 μM.

Fig. S5 Transient absorption spectra of MMC<sub>60</sub> (40 μM) observed by 355 nm laser irradiation in air-saturated DMSO-toluene (4/1, v/v) and 1% P123 buffer solution (HEPES, 10 mM, pH 7.4).