

### Synthesis of $\beta$ -cyclodextrin-polyethylene glycol ( $\beta$ -CD-PEG)

Thionyl chloride (8.72 mL) was slowly dropped into the PEG400 (21.5 mL) at room temperature for 5 h, followed by addition of  $\beta$ -CD (68.1 g) which has already been dissolved in an aqueous solution of NaOH at the thermostat (333.15 K) with a magnetic stirrer to mix approximately. After 7 h, the synthesis was stopped and the solution was neutralized to pH 7 by the HCl solution. The polymer was washed and extracted with ethanol to remove water, residual monomers, and initiator. Then, the bridged  $\beta$ -CD-PEG was further dried under vacuum oven at 333.15 K for 48 h.

Table Molecular weight measured by Asymmetric Field Flow Fractionation (AFFF)/ Light Scattering (LS) and hydrodynamic diameter measured by Dynamic Light Scattering (DLS) for polymers

Polymer	Mn /gmol <sup>-1</sup>	hydrodynamic diam/nm
$\beta$ -CD-PEG	3206	--
P(AM/VPPS/C <sub>18</sub> DMAAC)	2.74*10 <sup>6</sup>	5.57
Polymer/Bis-CD(ppm)	4.25*10 <sup>6</sup>	8.83