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SUPPLEMENTARY INFORMATION

Supplementary Figure

Synthesis and characterization of dialdehyde starch (DAS)

Three different OD of dialdehyde starch were synthesized by a one-pot synthesis procedure at 30°C for 6 h under exclusion of light, according to previous report. [1] The molar ratios between sodium periodate and soluble starch (1 g) in distilled water were 0.2, 0.4, 0.6, respectively. The pH of reaction solusion was adjusted to 3.5 by sulfuric acid. The slurry was filtered and the product was washed with anhydrous ethanol. Finally, DAS with different aldehyde contents was obtained by dried at 40°C for overnight. The chemical structure of DAS was identified by FTIR spectrometer (Fig. S1).

The OD of DAS, which defined as the percentage of starch units that have been oxidized, was determined by hydroxylamine hydrochloride titration with some modification. [2]

$$OD = \frac{162 \times (V_2 - V_1) \times C \times 10^{-3}}{2m} \times 100\%$$

where the C (mol/L) is the concentration of the standard hydrochloric acid solution, m is weight of DAS, the V_1 and V_2 (mL) are the volume of the standard hydroxylamine hydrochloric acid solution used by the test group and the control group, respectively. The OD of DAS are prepared at conditions of different molar ratios of $NaIO_4$/Guluronate unit, as shown in Table.S1.

Table.S1.OD of DAS prepared at the different molar ratios of $NaIO_4$/guluronate unit.

Sample	$NaIO_4$/Guluronate unit (mol/mol)	OD (%)
20% DAS	1/5	17.80
40% DAS	2/5	39.10

60% DAS	3/5	56.70

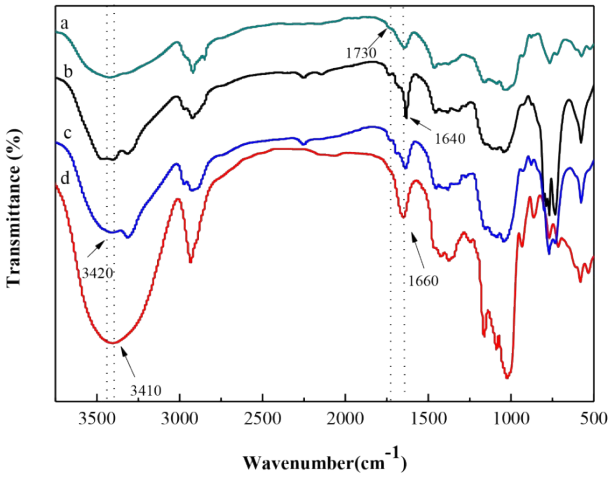

Fig.S1. FTIR spetra of starch and DAS: 20%DAS (a), 40%DAS (b), 60%DAS (c) and starch (d).

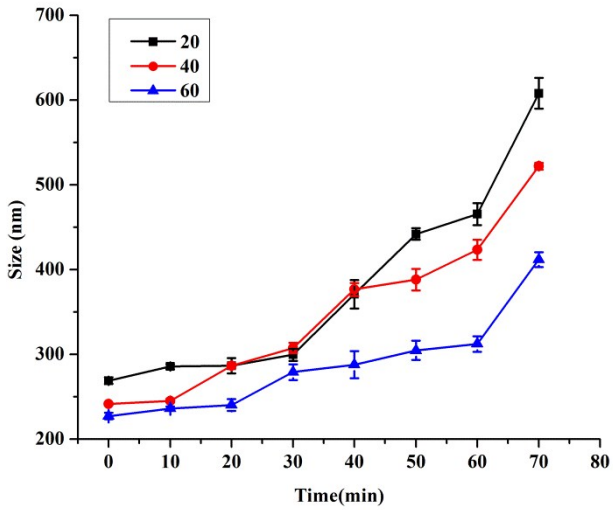

Fig.S2. Glucose-responsiveness of different OD of mPEG-DAS-APBA micelles in the presence of glucose with 2 g/L Glu.

REFERENCE

1. J. Yu, P. R. Chang and X. Ma, *Carbohydrate Polymers*, 2010, **79**, 296-300.
2. D. d. W. S. Veelaert O, K. F. Gotlieb and R. Verb, *Carbohydrate Polymers*, 1997) **33**, 153-162.