Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supplementary Information

Protecting Enzyme against Heat Inactivation by Temperature-sensitive Polymer in Confined Space

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1. Calculation of the number of CAB molecules and microemulsion droplets

The number of CAB molecules could be determined by:

$$N_{CAB} = N_A C_{CAB} V/M \quad (1)$$

Where N_A denotes Avogadro's number. C_{CAB} is the mass concentration of CAB in the water phase of microemulsion, V is the volume of the water phase and M is the molecular weight of CAB.

The number of microemulsion droplets could be determined by:

$$N_{droplet} = V_{water\ phase} / V_{droplet} = V_{water\ phase} / (\frac{4}{3}\pi R_h^3). \quad (2)$$

Where R_h is hydrodynamic radius of microemulsion droplets, which could be measured by DLS.

Taking CAB@E where CAB concentration is 0.016 mg/mL in microemulsion (0.14 mg/mL in water phase) for example, the number of CAB molecules in the whole microemulsion is approximately 2.91×10^{15}, and the number of microemulsion droplets is approximately 1.70×10^{18} at 20 °C and 7.27×10^{17} at 70 °C respectively (the volume of the water phase of one microemulsion sample is 1 mL).

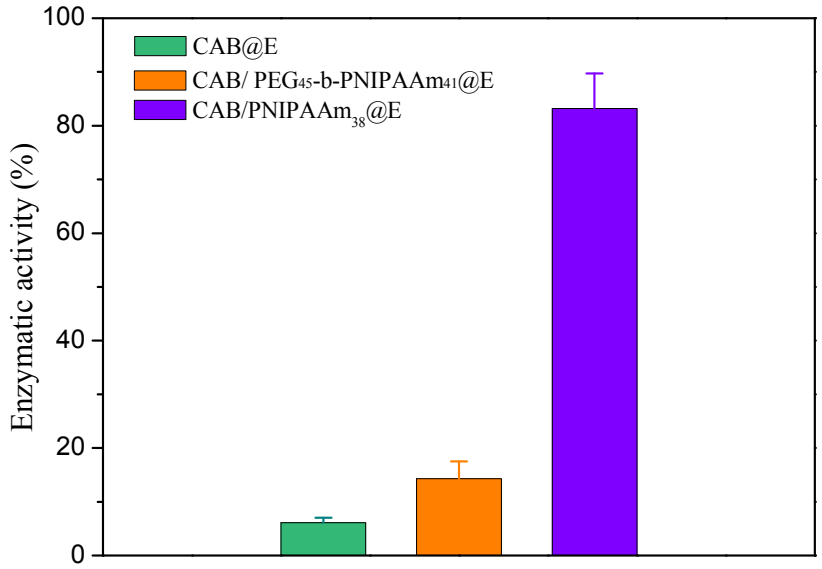

Figure S1. Residual enzymatic activity of free CAB and CAB with PEG_{45}-b-$PNIPAAm_{41}$ or $PNIPAAm_{38}$ in microemulsion after heat treatment, Concentrations of CAB, PEG_{45}-b-$PNIPAAm_{41}$ and $PNIPAAm_{38}$ are 0.016, 0.51 and 0.32 mg/mL respectively.

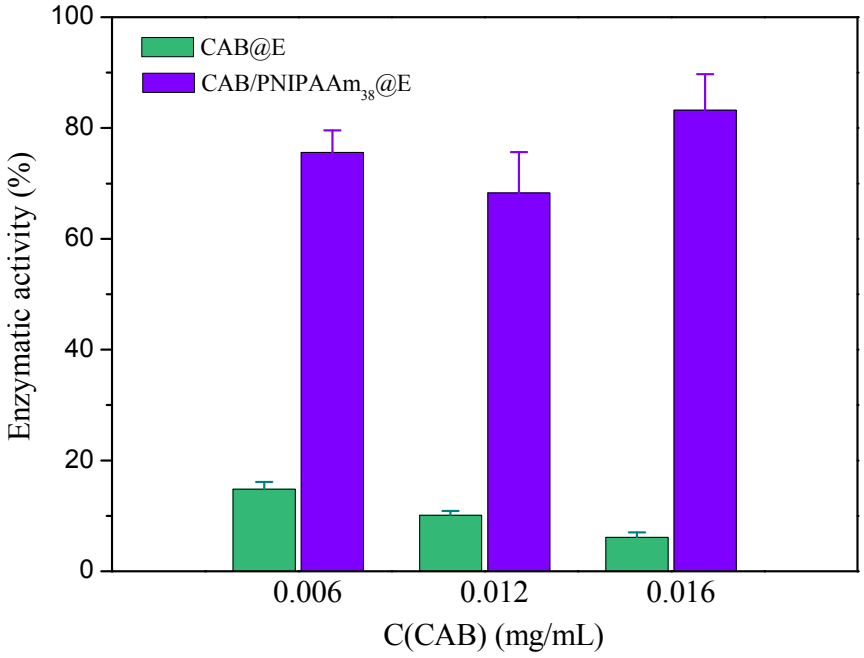

Figure S2. Residual enzymatic activity of free CAB and CAB with $PNIPAAm_{38}$ after heat treatment at CAB concentrations of 0.006, 0.012, 0.016 mg/mL in microemulsion, determined by comparison to enzymatic activity of native CAB@E of the identical concentration in microemulsion respectively. Concentration of $PNIPAAm_{38}$ is 0.32 mg/mL in microemulison.