Enzyme-active liquid coacervate microdroplets as artificial membraneless organelles for intracellular ROS scavenging

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Support Information

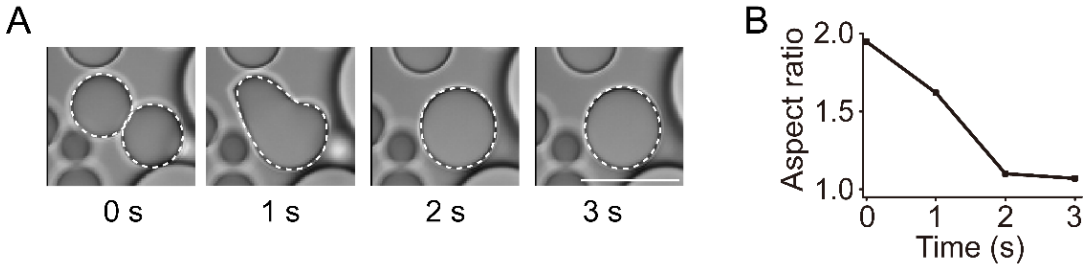

Figure S1. The liquid fluidity of the PDDA/PAA coacervate microdroplets was investigated by real-time monitoring the coalescence of two adjacent coacervate microdroplets (white dotted lines) at PDDA:PAA ratio of 0.6 and (B) the changes in the aspect ratios of coacervate microdroplets during coalescence. Scale bar: 5 µm.

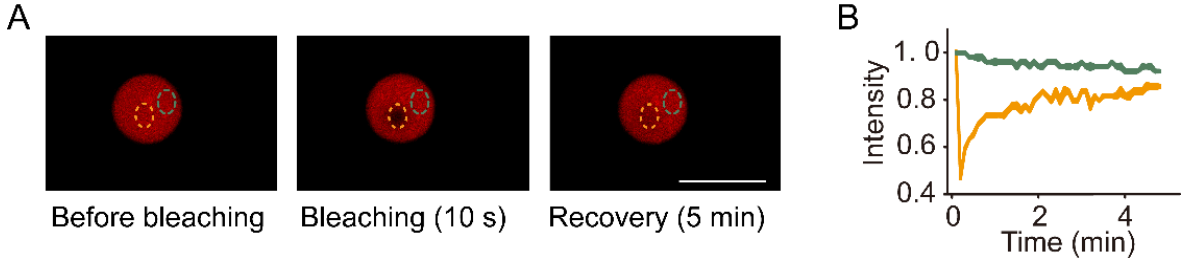

Figure S2. (A) The liquid fluidity of the coacervate microdroplets was investigated using FRAP. PDDA: PAA=0.6, scale bars: 5 µm. (B) The time-dependent fluorescence intensity of the ROI (yellow lines) and control region (black lines) in (A) for single coacervate microdroplets during FRAP.

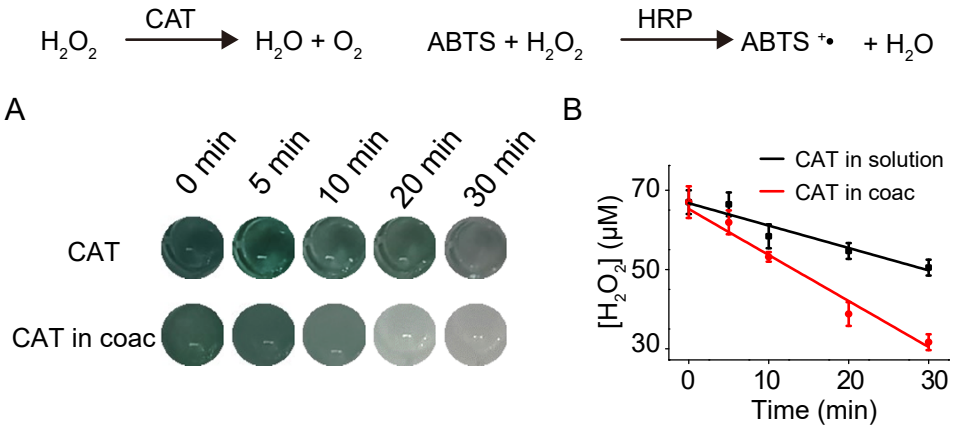

Figure S3. (A) Photograph of CAT in solution and CAT-containing coacervate suspension for H_2O_2-ABTS assay, and (B) corresponding time-dependent degradation of H_2O_2 by enzyme-active reaction. The catalytic activity of CAT in solution (black line) and coacervate phase (red line) by H_2O_2-ABTS colorimetric assay. CAT was encapsulated in coacervate microdroplets (coacervate: 0.1 mg/mL, CAT: 0.1 mg/mL) and incubated with exogenous 67 μM H_2O_2 to consume H_2O_2 by CAT-mediated enzymatic reaction at different reaction time (0, 5, 10, 20, 30 min).

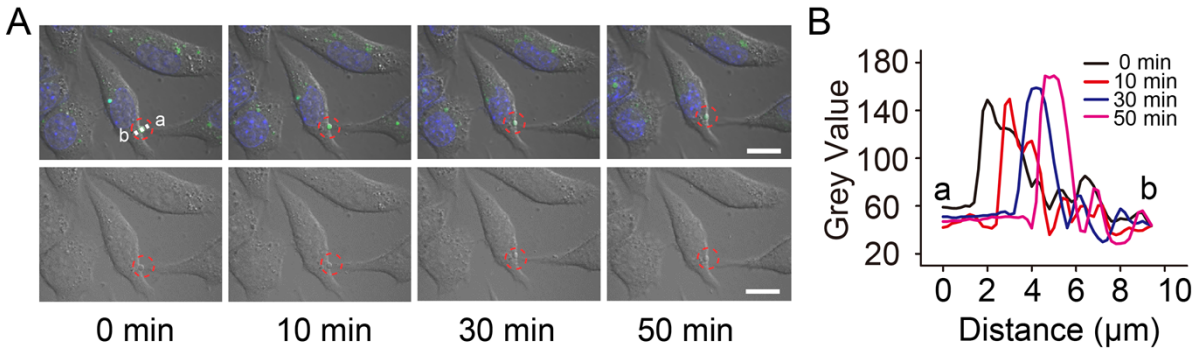

Figure S4. (A) Time-dependent fluorescent images of cell internalization. CAT-containing coacervate microdroplets were incubated with SMMC-7721 cells. CAT was labelled with FITC as FITC-CAT. A green fluorescent coacervate spot (red dotted circle) was adhered on the cell membrane and then internalized into cell interior. Scale bars, 10 μm. (B) A quantitative profile analysis of the fluorescent intensity as shown in the white line (a-b) in (A).

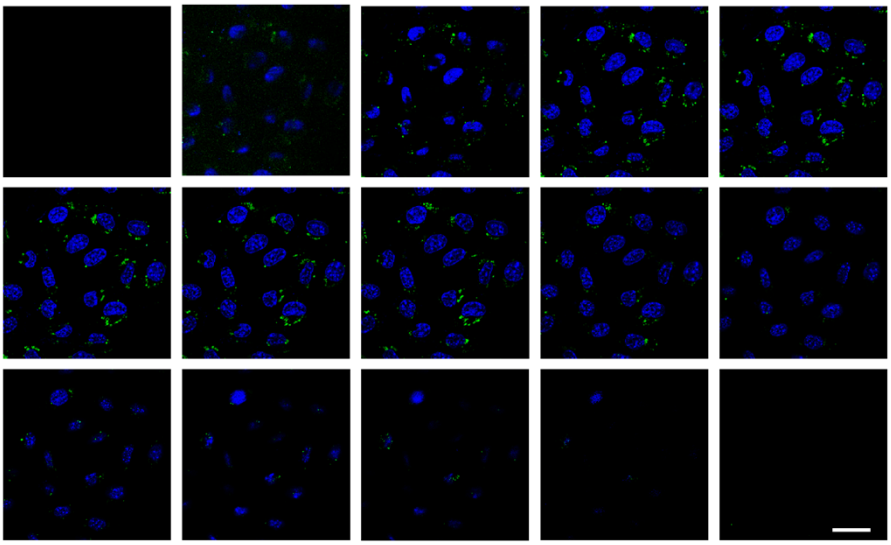

Figure S5. Z-axis cell fluorescent imaging after internalization of FITC-CAT-containing coacervate microdroplets. Cell nucleus was strained by Hoechst with blue fluorescence. Scale bar: 20 μm. Z pixels resolution: 0.35 μm/frame.

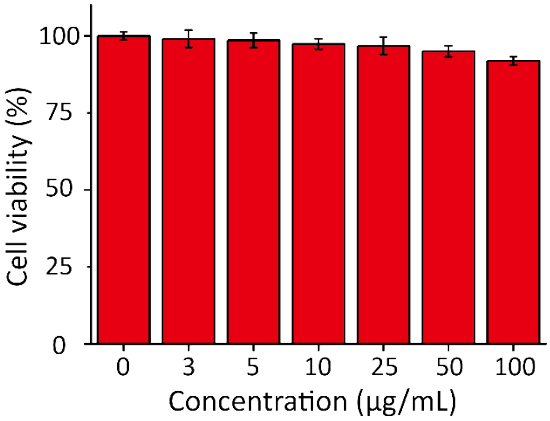

Figure S6. Determination of cell viability after incubation with different concentration of CAT-containing coacervate microdroplets (CAT: 64 μg/mL, coacervate: 0-100 μg/mL). The SMMC-7721 cells were incubated with sample at 37 °C for 24 h, and the cell viability was measured by MTS assay.