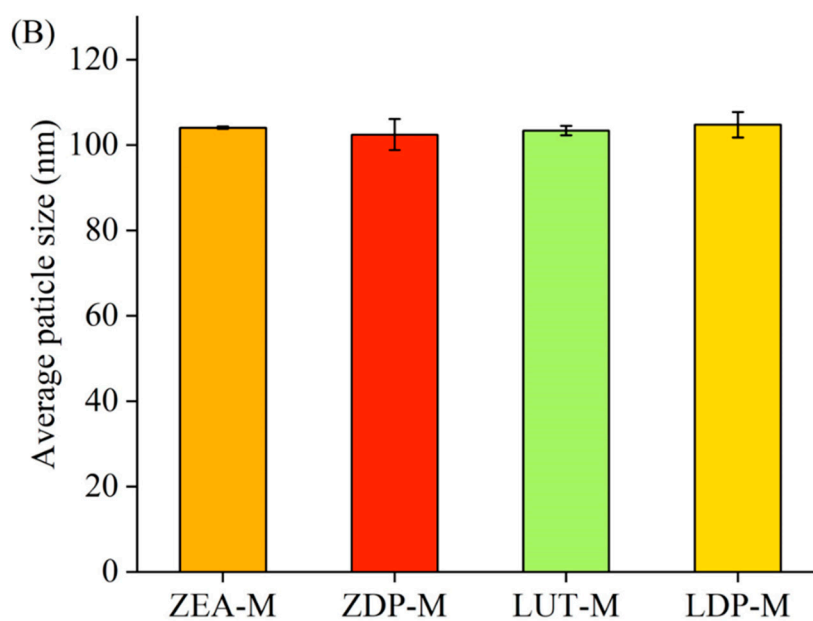
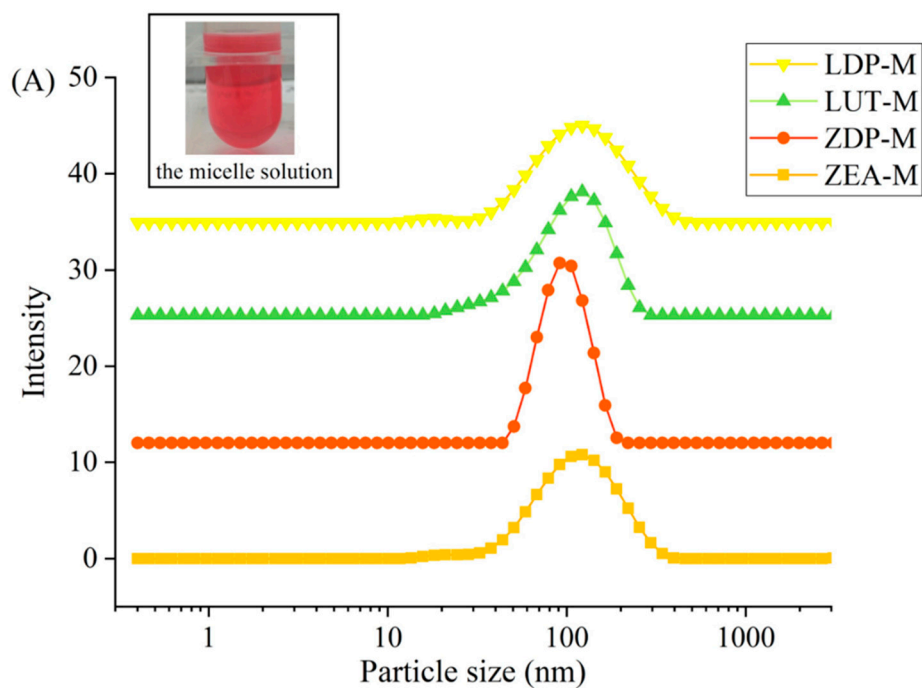
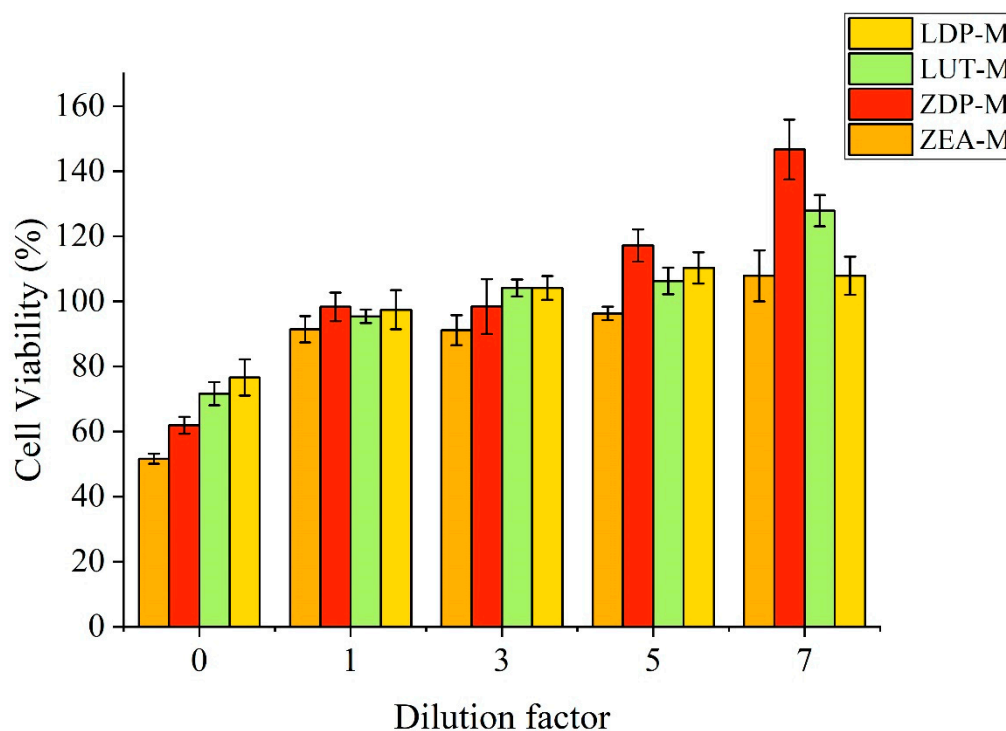
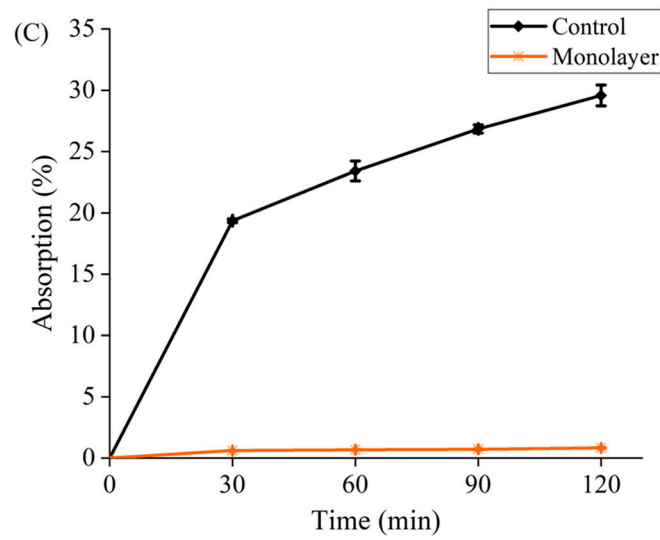
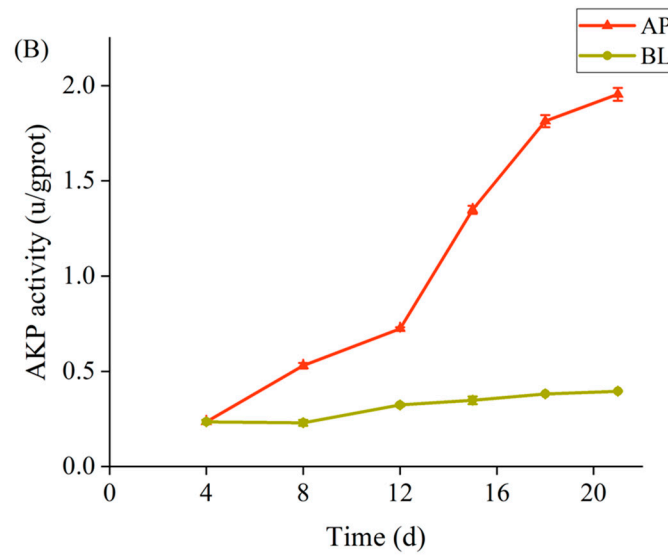
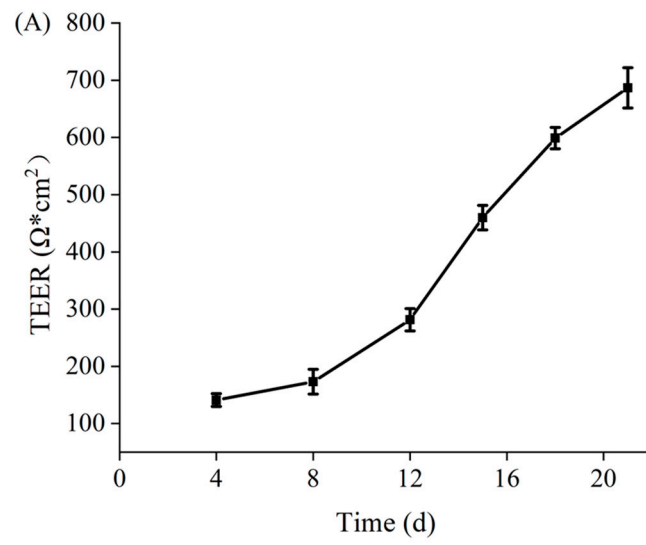




Supplementary Figure S1. Particle size distribution (A) and average particle sizes (B) of the free and esterified xanthophyll micelles. Data are expressed as mean $\pm$ SD, $n=3$. ZEA-M, ZDP-M, LUT-M, and LDP-M are micelles of zeaxanthin, zeaxanthin dipalmitate, lutein, and lutein dipalmitate, respectively.



Supplementary Figure S2. Cytotoxicity assays of Caco-2 cells treated with free and esterified xanthophyll micelles. Dilution factors of 1, 3, 5, and 7 implied the micelles were diluted with DMEM medium at ratios of 1:1, 1:3, 1:5, and 1:7, respectively. The initial xanthophyll concentrations in ZEA-M, ZDP-M, LUT-M, or LDP-M were 1.84 ± 0.13 nmol/mL, 1.90 ± 0.08 nmol/mL, 1.92 ± 0.02 nmol/mL, and 1.86 ± 0.01 nmol/mL, respectively. Data were expressed as mean $\pm$ SD, $n=5$. ZEA-M, ZDP-M, LUT-M, and LDP-M are micelles containing zeaxanthin, zeaxanthin dipalmitate, lutein, and lutein dipalmitate, respectively.



Supplementary Figure S3. Establishment of a 21-day Caco-2 cell monolayer model.

(A) Real-time monitoring of TEER value. (B) AKP activity at AP and BL sides. (C)

Absorption of sodium fluorescein over time. AP: apical compartment of Caco-2 cell monolayer model; BL: basolateral compartment of Caco-2 cell monolayer model;

Control: transwell cell culture chamber without Caco-2 cells; Monolayer: transwell cell culture chamber with Caco-2 cell monolayers. Data are expressed as mean $\pm$ SD, $n=3$.