

Supporting Information

Interactive influence of extracellular polymeric substances (EPS) and electrolytes on the colloidal stability of silver nanoparticles

Ishara Fernando^{1,2}, Dan Lu^{2,3}, Yan Zhou^{2,3*}

¹Interdisciplinary Graduate School, Nanyang Technological University, Singapore 639798.

²Nanyang Environment & Water Research Institute, Advanced Environmental Biotechnology Centre, Nanyang Technological University, 1 Cleantech Loop, CleanTech One, Singapore 637141.

³School of Civil & Environmental Engineering, College of Engineering, Nanyang Technological University, Singapore 639798.

*Corresponding author at: Tel.: +65 6790 6103; E-mail address: zhouyan@ntu.edu.sg

Experimental Methods

1. FTIR

FTIR spectra were obtained on a spectrometer (Perkin Elmer, Frontier Series) equipped with Mercury Cadmium Telluride (MCT)-(MIR) liquid nitrogen-cooled detector and Spectrum processing software. FTIR spectrum was acquired in the 4000-600 cm^{-1} region with a resolution of 16 cm^{-1} .

2. Adsorption Experiments

AgNP suspensions and EPS solutions were mixed with NaNO_3 and $\text{Ca}(\text{NO}_3)_2$ solutions at different concentrations. The mixture was gently shaken at 25 °C for 2 h and centrifuged at 20,000 g for 30 min. The total organic C of SB-EPS, LB-EPS and TB-EPS in the supernatant were determined using a TOC analyzer (multi N/C 3100, Analytik Jena, Germany). The amount of EPS-C adsorbed was calculated by the difference between the amount of EPS added and that remaining in the supernatant.

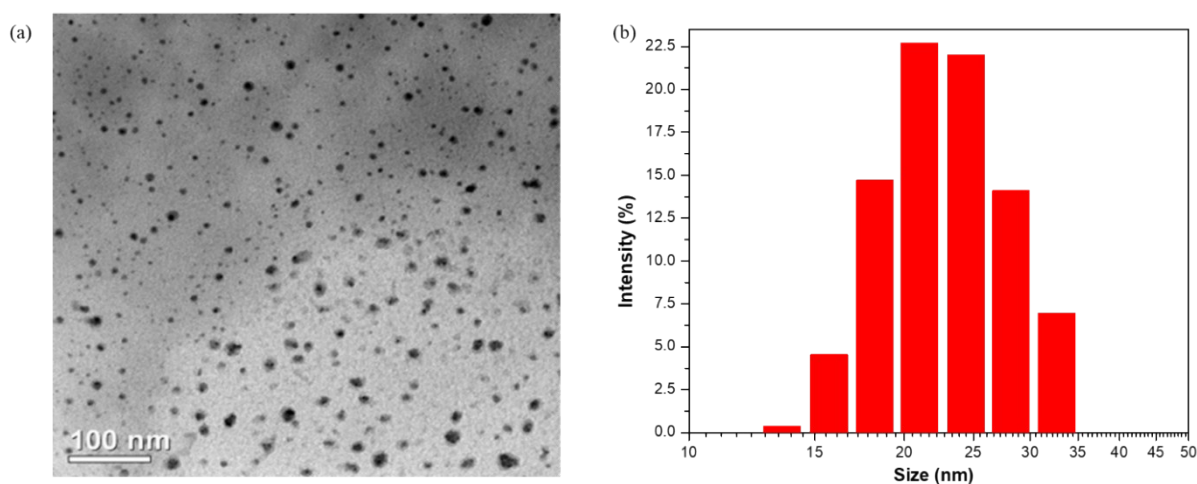


Fig. S1. Characterization of the synthesized AgNPs (a) Morphology of AgNPs in parent solution observed by TEM; (b) Particle Size distribution of the AgNPs in parent solution.

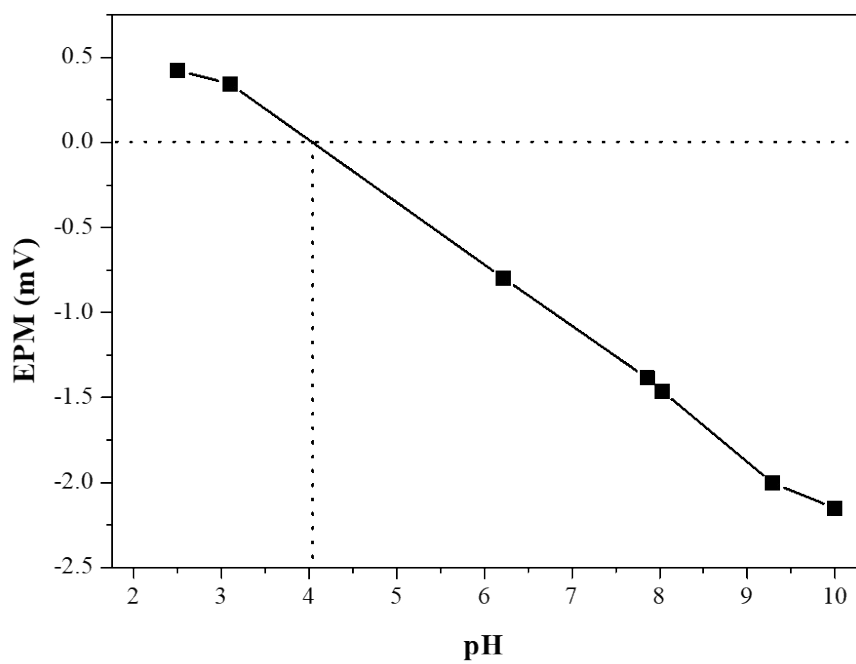


Fig. S2. EPM of AgNPs as a function of pH

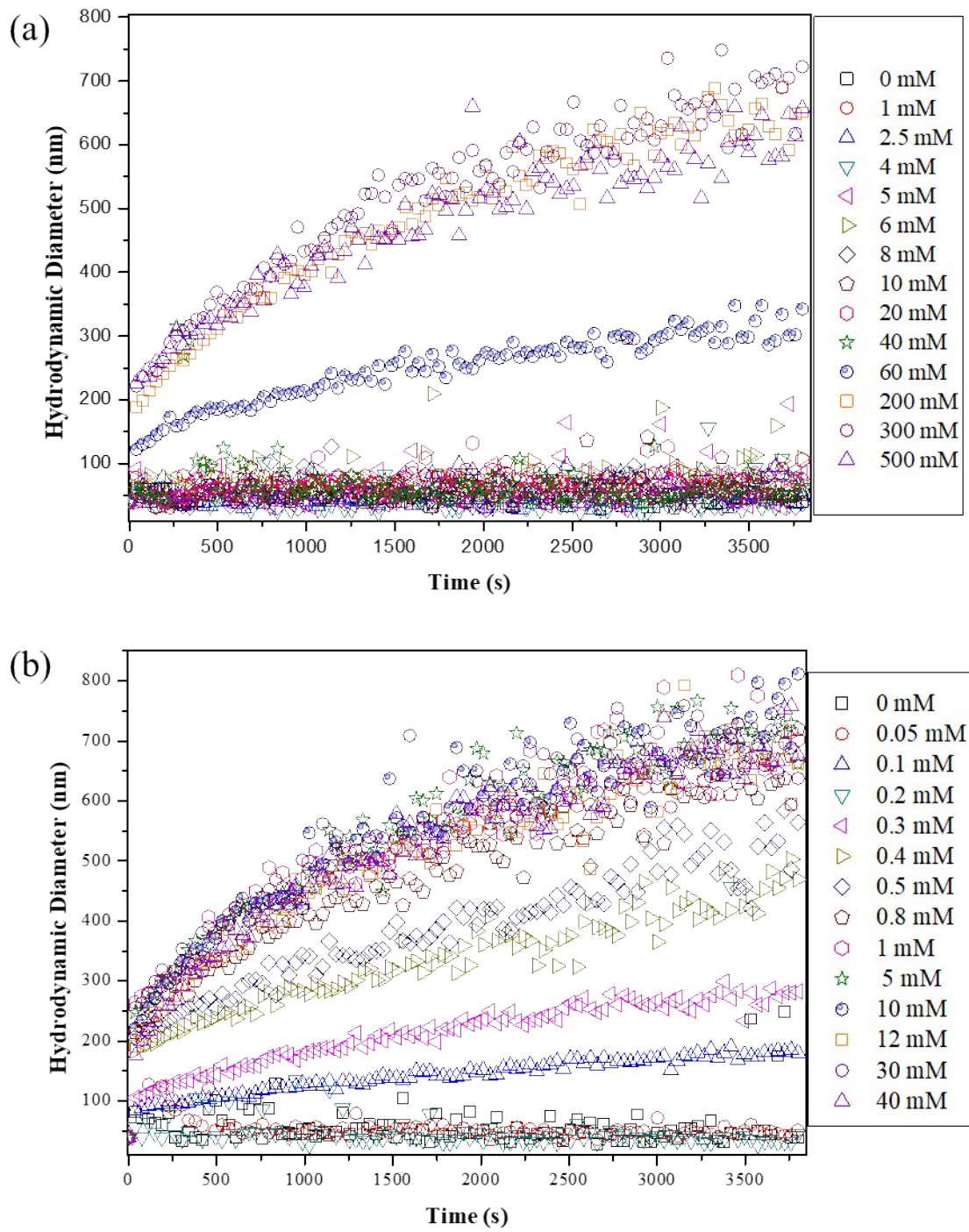


Fig. S3. Aggregation profiles of AgNPs in (a) NaNO₃ and (b) Ca(NO₃)₂ solutions.

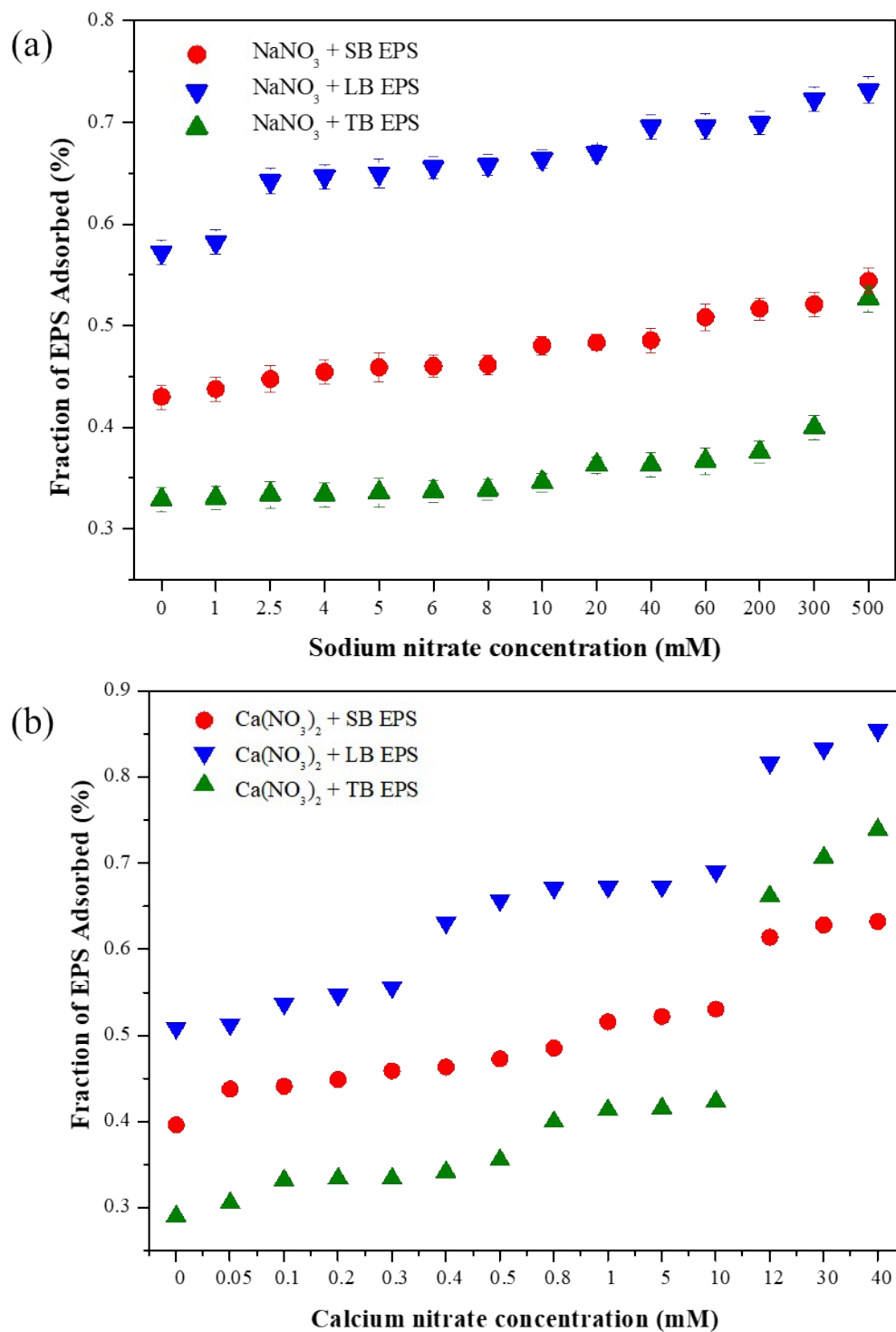
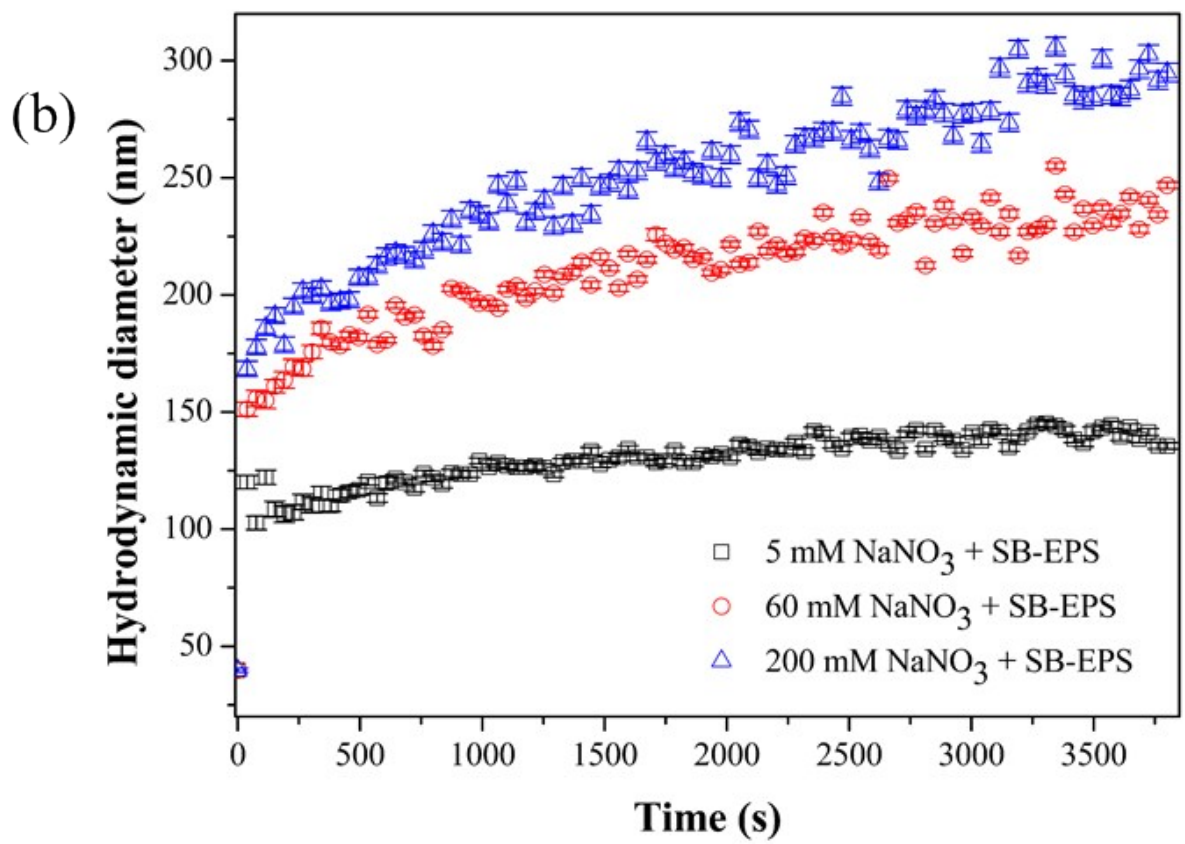
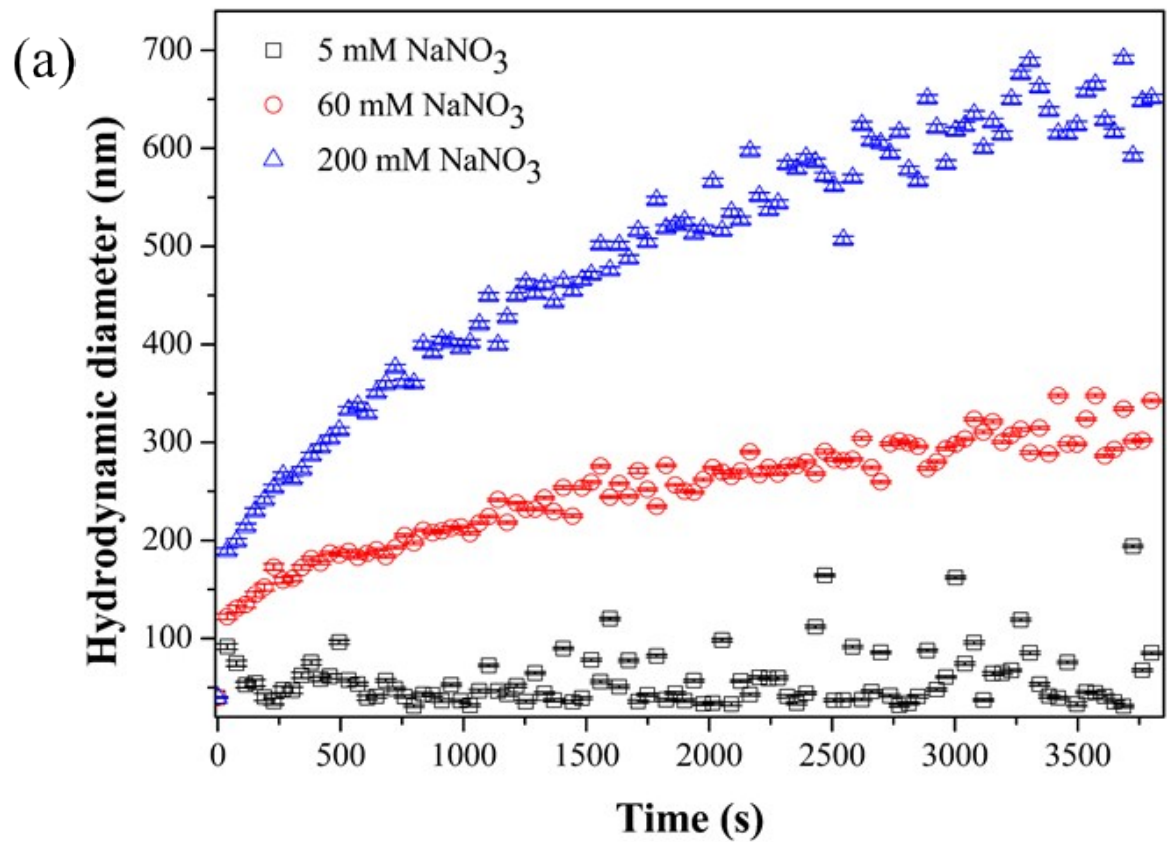


Fig. S4. The mass fraction of EPS-C adsorbed by AgNPs as a function of (a) NaNO₃ and (b) Ca(NO₃)₂ concentration.



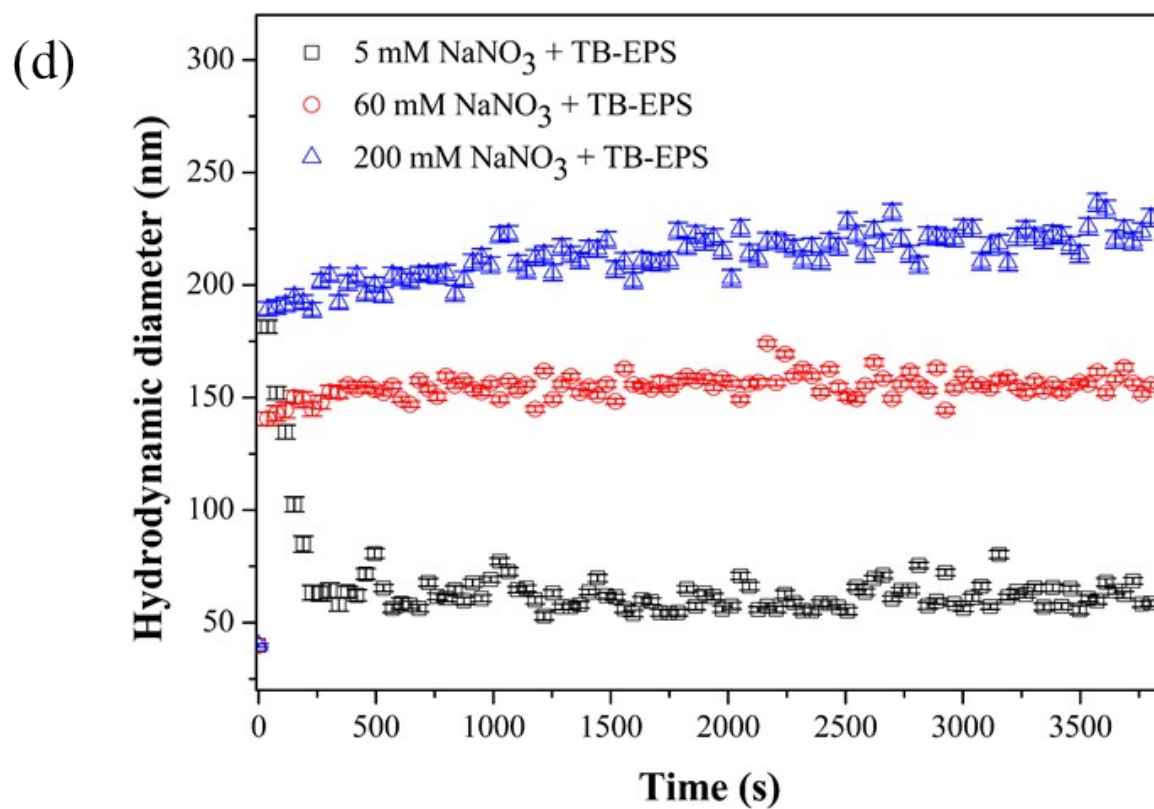
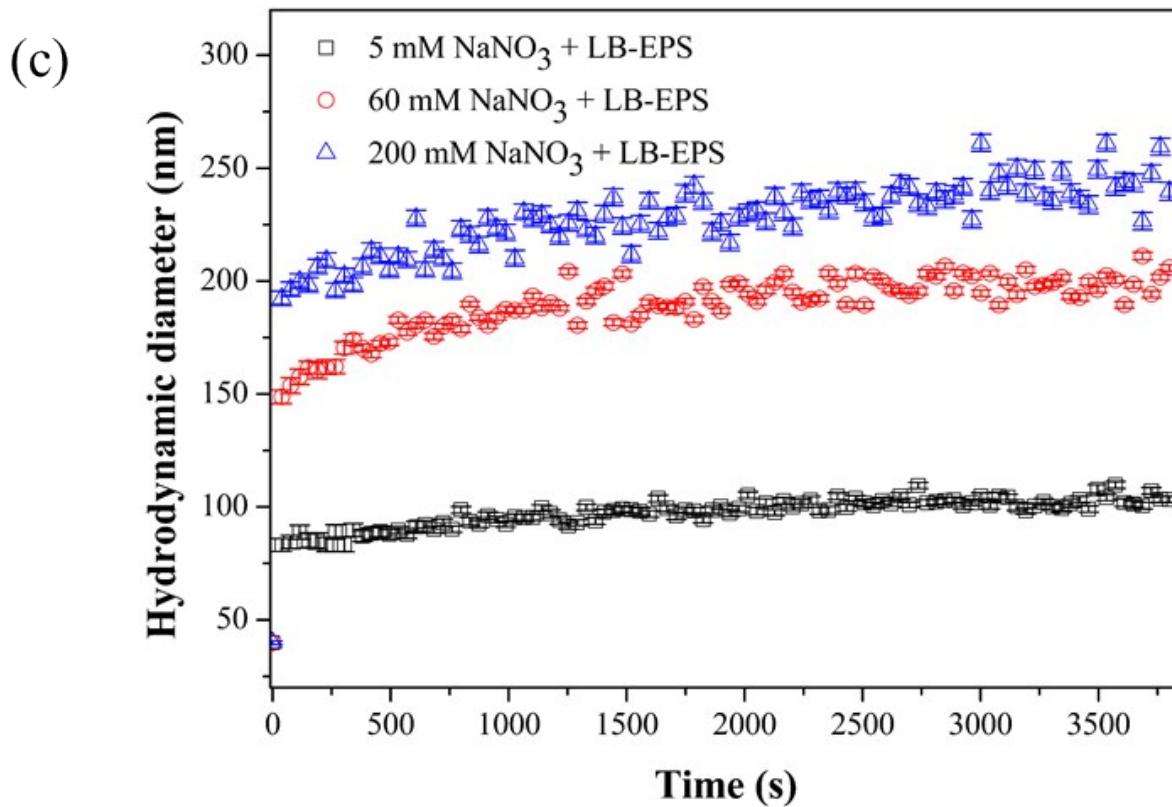
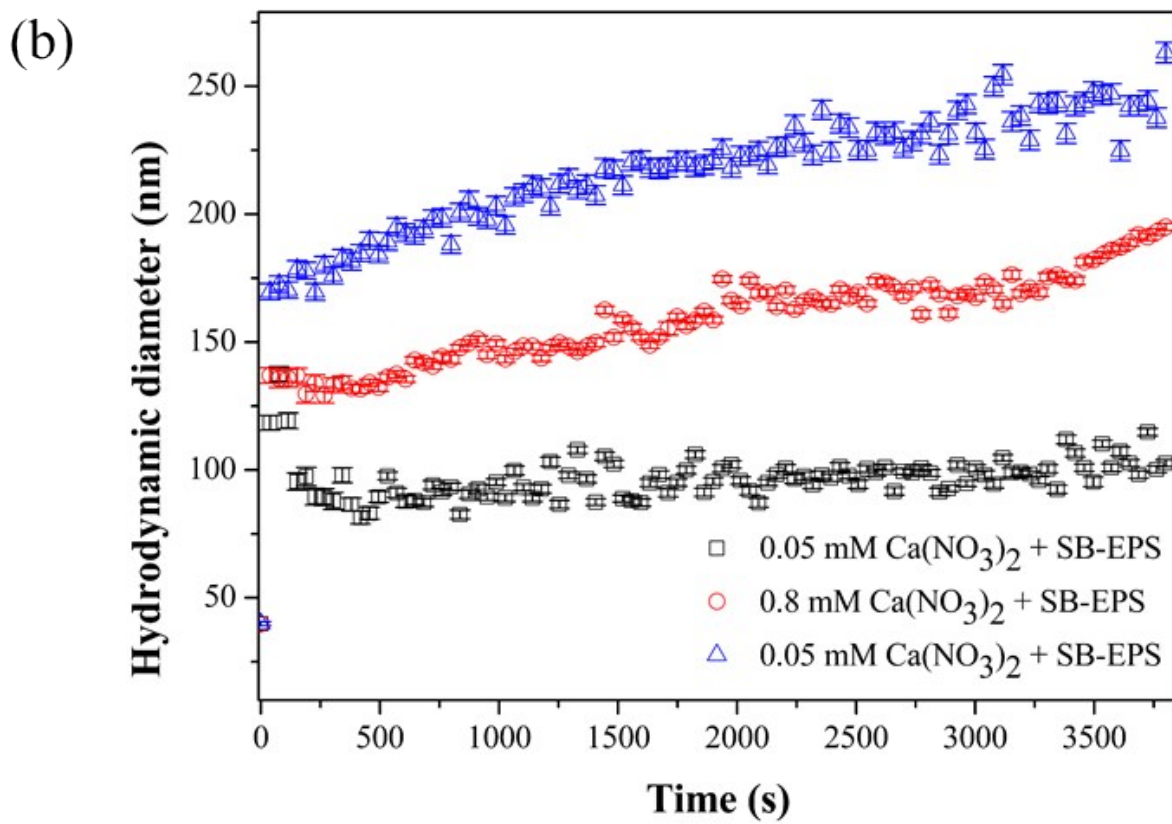
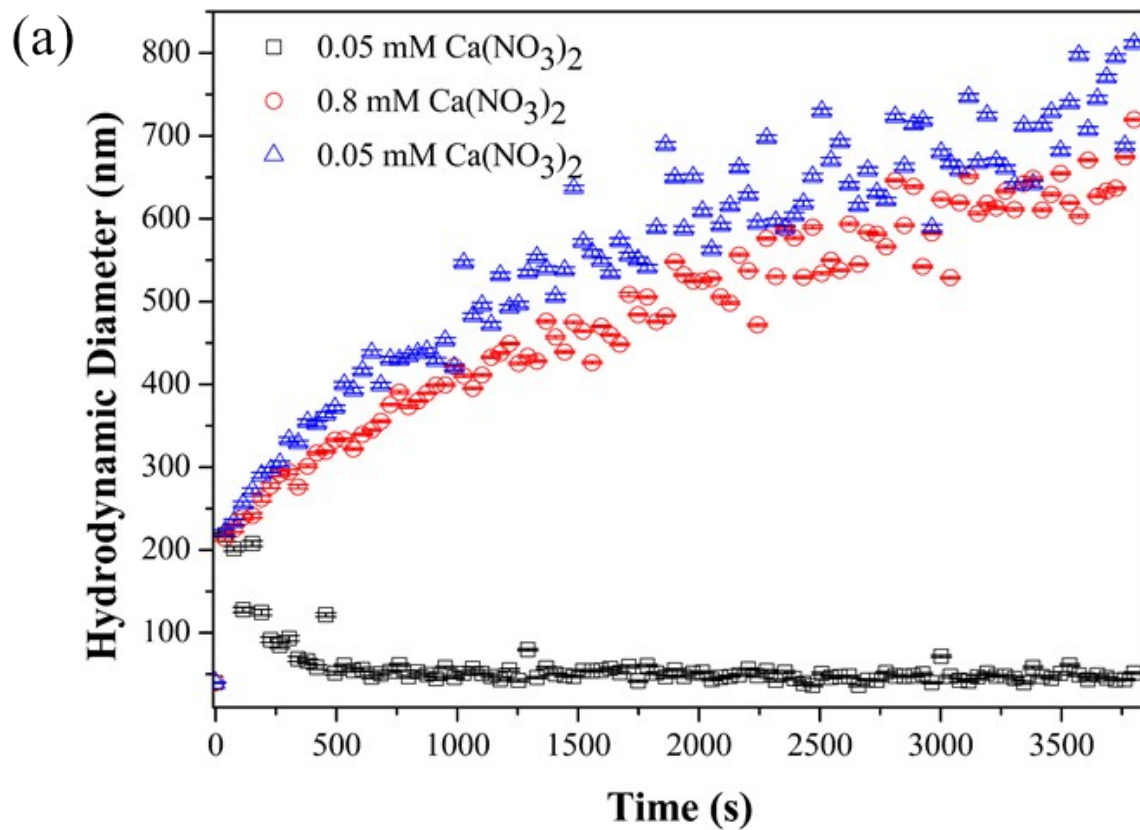


Fig. S5. Aggregation profiles of AgNPs in various NaNO₃ solutions in the (a) absence and presence of (b) SB-EPS, (c) LB-EPS and (d) TB-EPS.



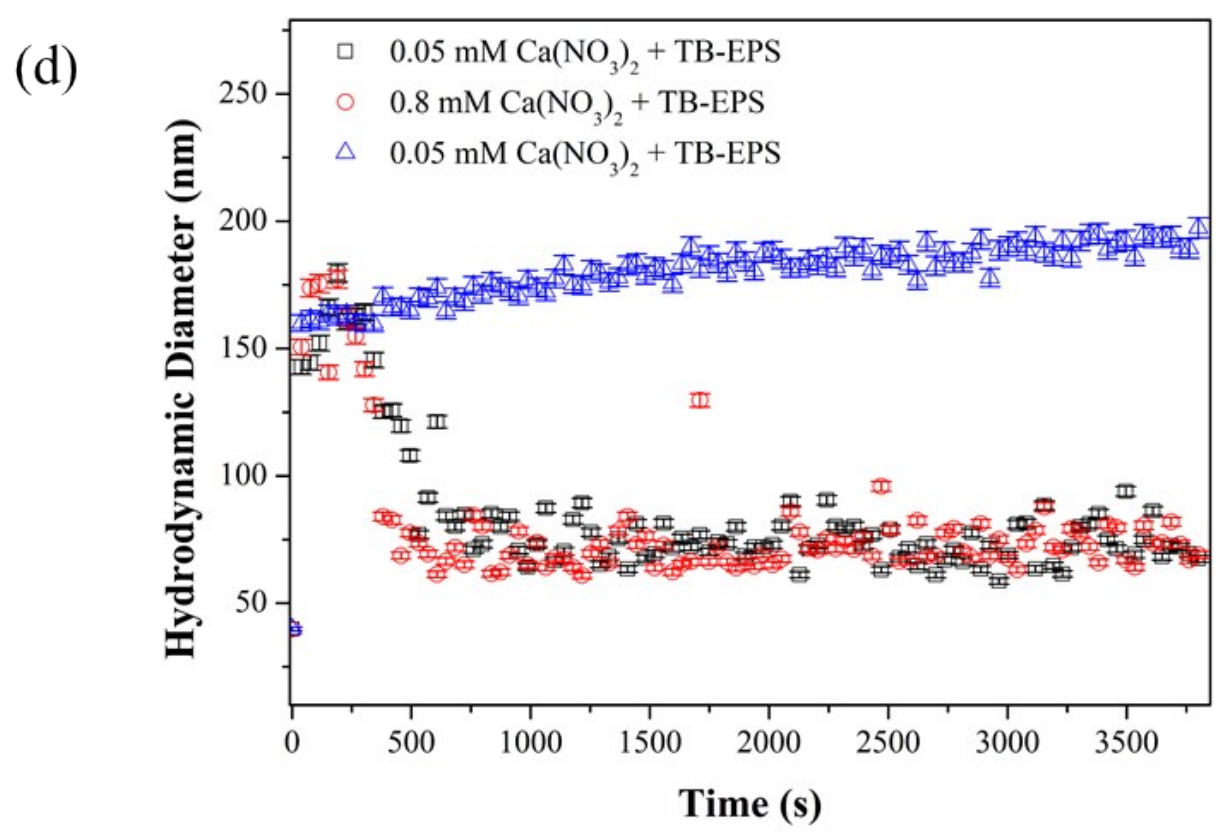
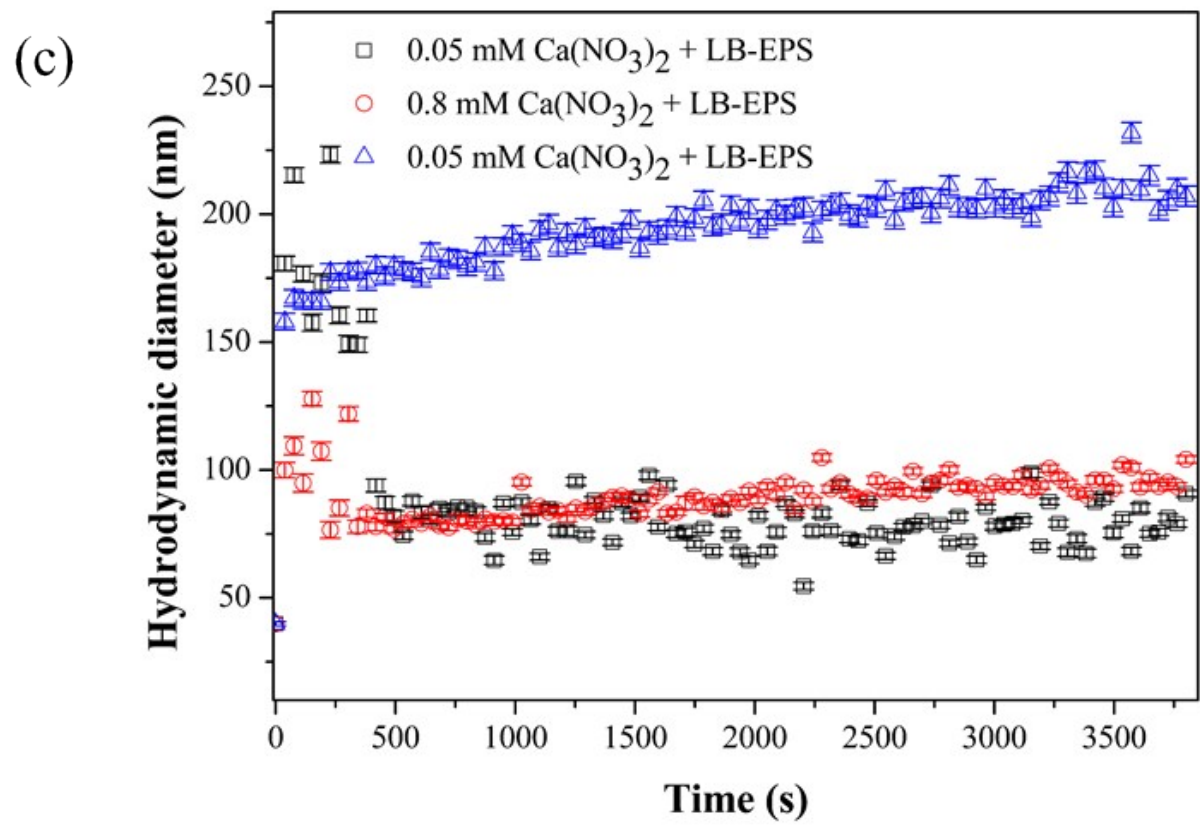


Fig. S6. Aggregation profiles of AgNPs in various $\text{Ca}(\text{NO}_3)_2$ solutions in the (a) absence and presence of (b) SB-EPS, (c) LB-EPS and (d) TB-EPS

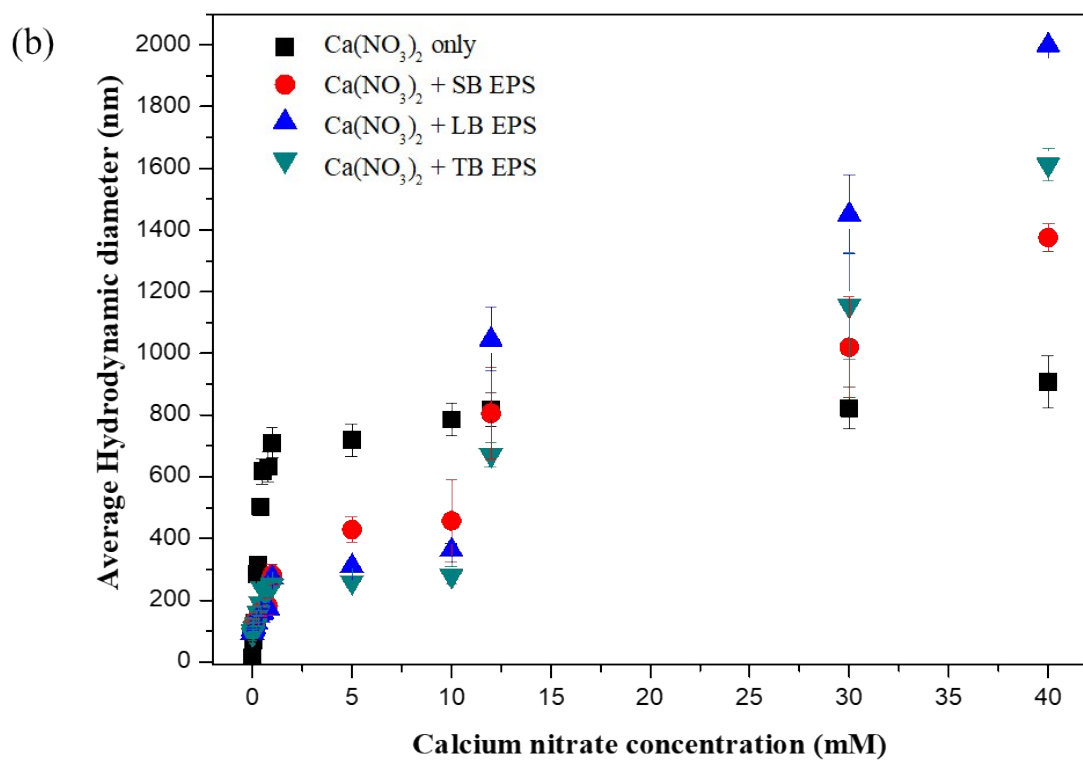
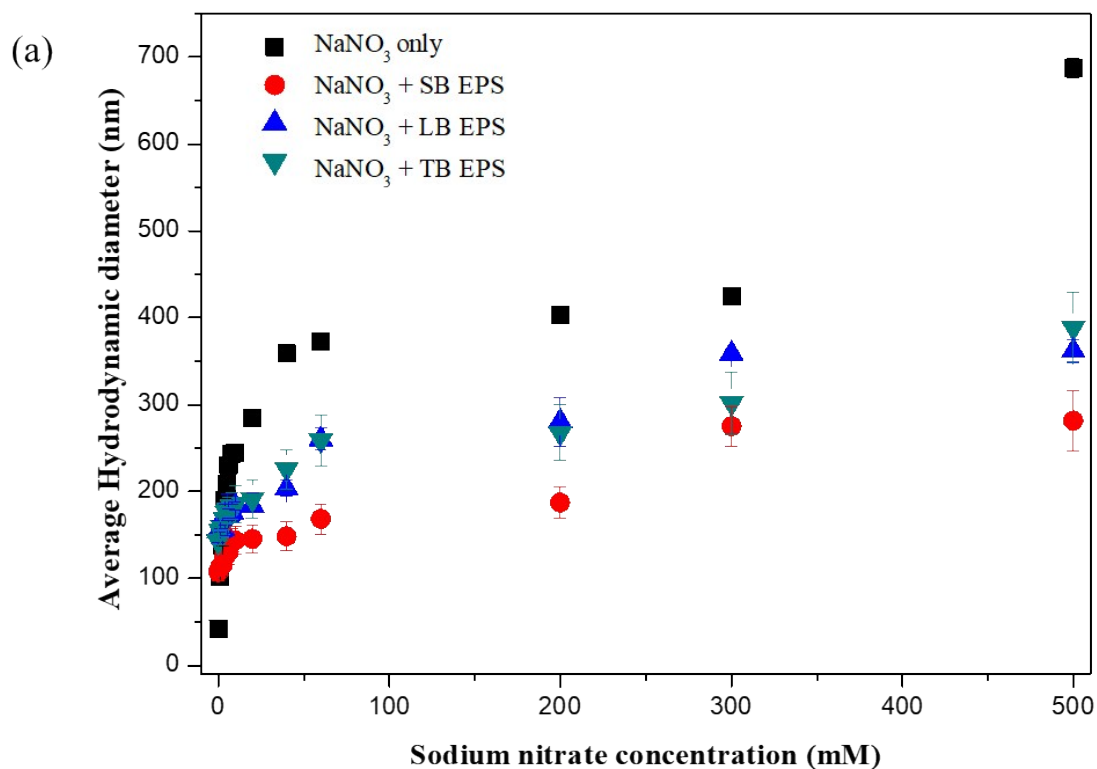


Fig. S7. Z-average diameter of AgNPs with and without SB-EPS, LB-EPS and TB-EPS as a function of (a) NaNO₃ and (b) Ca(NO₃)₂ concentration.