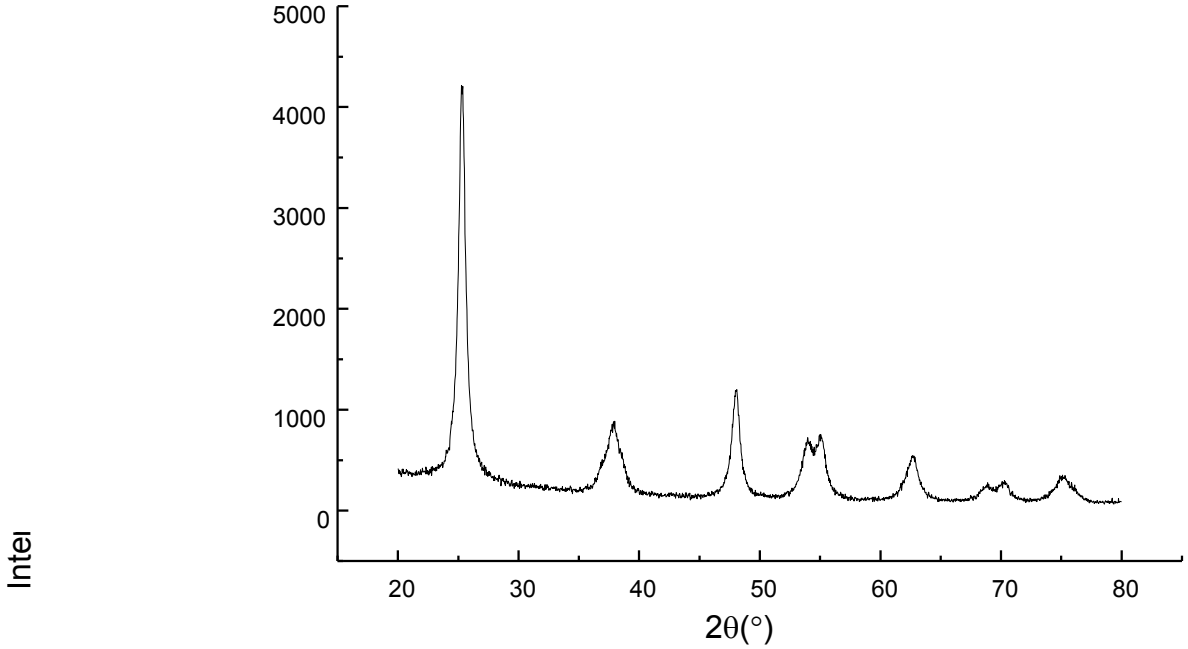
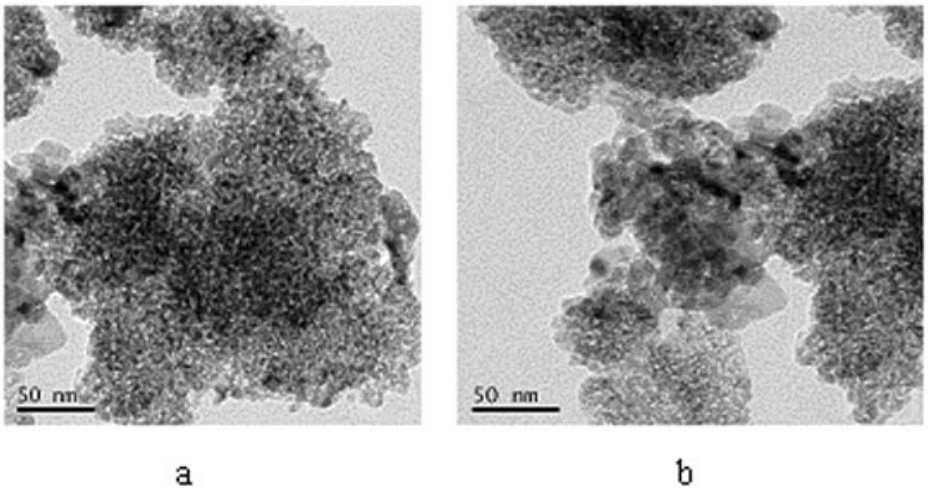
Nano-TiO_2 *characteristics*

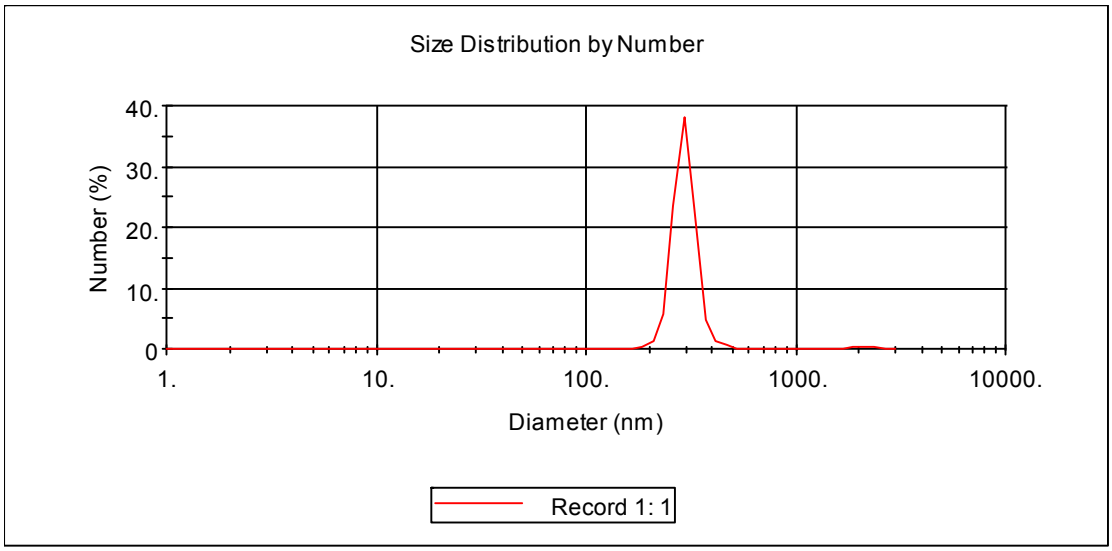
XRD measurements showed that nano-TiO_2 exhibited the anatase structure (Suppl Figure 1), and the average particle size calculated from the broadening of the (101) XRD peak of anatase was approximately 5.5 nm using Scherrer's equation. TEM demonstrated that the average size of the powder particles (Suppl Figure 2a) and NPs suspended in HPMC solvent after incubation ranged from 5—6 nm, respectively (Suppl Figure 2b), which was consistent with the XRD results. The sample surface area was generally smaller than that estimated from the particle size, and it would seem that aggregation of the particles may have caused this decrease. To confirm the dispersion and stability of the nano-TiO_2 suspension, the aggregated size and the ζ potential of nano-TiO_2 in HPMC were measured. Following 24 h incubation, the mean hydrodynamic diameter of nano-TiO_2 in HPMC solvent ranged from 210 to 450 nm (mainly 310 nm), as measured by DLS, which indicated that the majority of nano-TiO_2 were clustered and aggregated in solution. In addition, the surface area of the sample was 174.8 m^2/g, and the ζ potential was and 9.28 mV.



Supplementary Figure 1 The (101) X-ray diffraction peak of nanoparticulate anatase TiO_2. The average grain size was about 5 nm by calculation of Scherrer's equation.



Supplementary Figure 2 Transmission electron microscope images of anatase nano-TiO_2. (a) nano-TiO_2 powder; (b) nano-TiO_2 suspended in HPMC solvent after incubation for 24 h. TEM images showed that the sizes of the nano-TiO_2 powder or nano-TiO_2 suspended in HPMC solvent for 24 h ranged from 5 to 6 nm, respectively.



Supplementary Figure 3 Hydrodynamic diameter distribution of nano-TiO_2 in HPMC solvent using DLS characterization.