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 $\zeta$ 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 $\zeta$ 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-TiO₂. (a) nano-TiO₂ powder; (b) nano-TiO₂ suspended in HPMC solvent after incubation for 24 h. TEM images showed that the sizes of the nano-TiO₂ powder or nano-TiO₂ 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.