Electronic Supplementary Information (ESI)

Sub 10-nm strontium titanate nanocubes highly-dispersed in non-polar organic solvents

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Preparation procedure for $SrTiO_3$ particles

Materials. Titanium bis(ammonium lactate)dihydroxide solution (TALH) (Chart S1), and strontium hydroxide octahydrate were purchased from Sigma-Aldrich. Tetramethylammonium hydroxide (TMAOH), oleic acid and hydrazine were obtained from Tokyo Chemical Industry. All reagents were used as received. The water used in all experiments was deionized with a Millipore Milli-Q system.

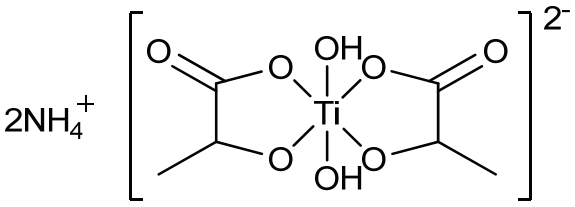

Chart S1. Chemical structure of TALH.

Preparation of $SrTiO_3$ particles. Aqueous solutions of TALH (0.625 mmol) and strontium hydroxide octahydrate (0.625 mmol) were mixed in deionized water. The pH of the solution was adjusted to 13.5 by adding TMAOH. Hydrazine (1 mmol) and oleic acid (0 or 2.5 mmol) were added as additives. The total volume of the solution was fixed at 25 mL. The reaction mixture was placed in a polytetrafluoroethylene (PTFE) vessel. The vessel was sealed and placed inside a stainless steel autoclave, which was heated in an oven for 24 h at 120 or 200ºC. The products

obtained were collected by centrifugation. In the case of the sample prepared with oleic acid, the centrifuged product was extracted with hexane. The final products were precipitated from hexane by the addition of ethanol as an antisolvent, then collected by centrifugation.

Characterization. The phase compositions of the precipitates were determined by X-ray diffraction analysis (XRD; RINT-2100, Rigaku; CuKα; 0.15418 nm, 40 kV, 30 mA, scanning speed 3º min^{-1}). Particle size and particle size distribution were evaluated by dynamic light scattering (DLS), using a Photal ELS-Z2 (Ohtsuka Electronics Co. Ltd.) instrument. Transmission electron microscopy (TEM) images were captured with a Hitachi H-800 microscope operated at 200 kV. High resolution (HR)-TEM images were captured with a JEOL JEM-2010 microscope operated at 200 kV. samples were prepared by depositing a droplet of the dispersion on a carbon-coated copper grid covered with polyvinyl formal film or elastic carbon film, and drying in air overnight. FT-IR spectra of $SrTiO_3$ nanocubes and oleic acid were collected with a PerkinElmer Spectrum One FT-IR spectrometer, fitted with a Universal ATR polarization accessory (1-reflection mode); spectra were recorded over the range 4000-400 cm^{-1}.