Supporting Information for

Single Nanocrystals of Anatase-Type TiO_2 Prepared from Layered Titanate Nanosheets: Formation Mechanism and Characterization of Surface Properties

Puhong Wen,[†,‡] Hiroshi Itoh,[†] Weiping Tang,[§] and Qi Feng*[,†]

[†] *Department of Advanced Materials Science, Faculty of Engineering, Kagawa University, 2217-20 Hayashi, Takamatsu 761-0396, Japan*

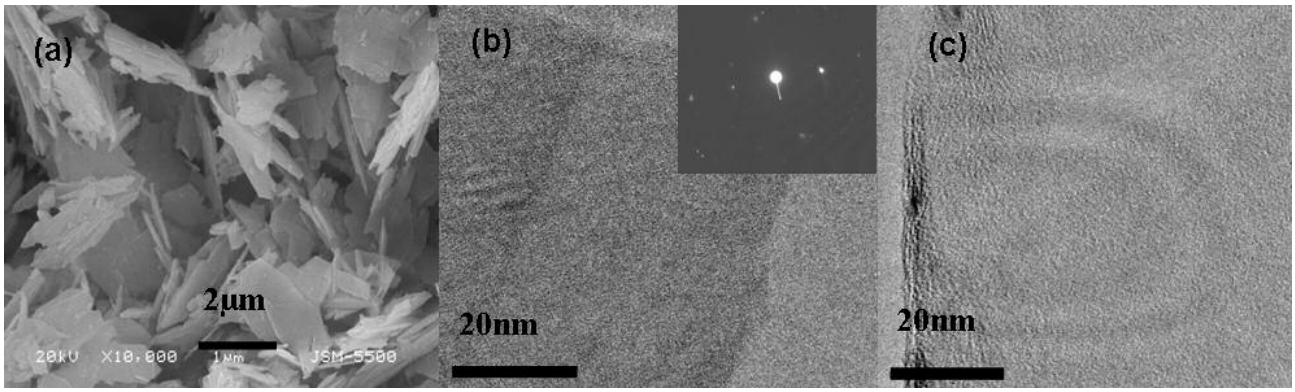

Fig. S1. SEM image of (a) HTO particles, TEM images of exfoliated (b) TBA-HTO and (c) PA-HTO nanosheets. The inset is SAED pattern. The HTO sample has plate-like particle morphology before the exfoliation treatment (Fig. S1a). Fig. S1b and c show TEM images of the exfoliated samples prepared by loading the nanosheet colloidal solutions on a microgrid and dried at room temperature. After the exfoliation reaction, nanosheet-like particles with particle dimensions of micrometer order in width and nanometer order in thickness were obtained. The width is almost same as that of HTO plate-like particle. The thickness of TBA-nanosheet sample is thinner than that of PA-HTO nanosheet sample. The SAED pattern of the nanosheets indicates that the nanosheets retain the lepidocrocite-like layered structure in (010) plane direction (Fig. S1b).

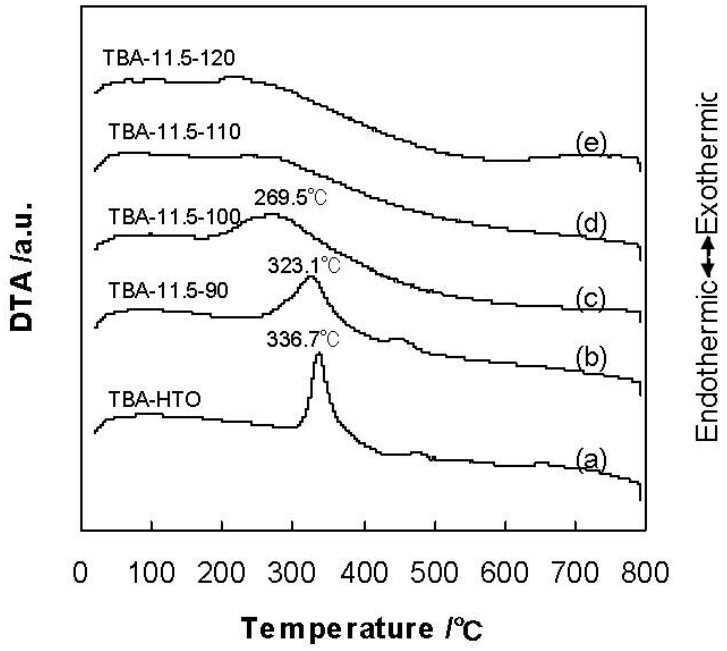

Fig. S2. DTA curves of (a) TBA-HTO nanosheet sample and the samples obtained by hydrothermal treatment of TBA-HTO colloidal solution (pH 11.5) at (a) 90, (b) 100, (c) 110, and (d) 120 ^{o}C, respectively. The TBA-HTO nanosheet sample before the hydrothermal treatment showed a large exothermic peak at 337 ^{o}C. This peak corresponds to thermal decomposition of TBA^{+} ions in the interlayer space. The exothermic peak gradually decreased its intensity and shifted to low temperature up to 100 ^{o}C of the hydrothermal treatment temperature, and disappeared completely above 110 ^{o}C of the hydrothermal treatment temperature. This fact reveals that the transformation from the layered phase to anatase phase accompanies loss of TBA^{+} ions from the titanate nanosheets.

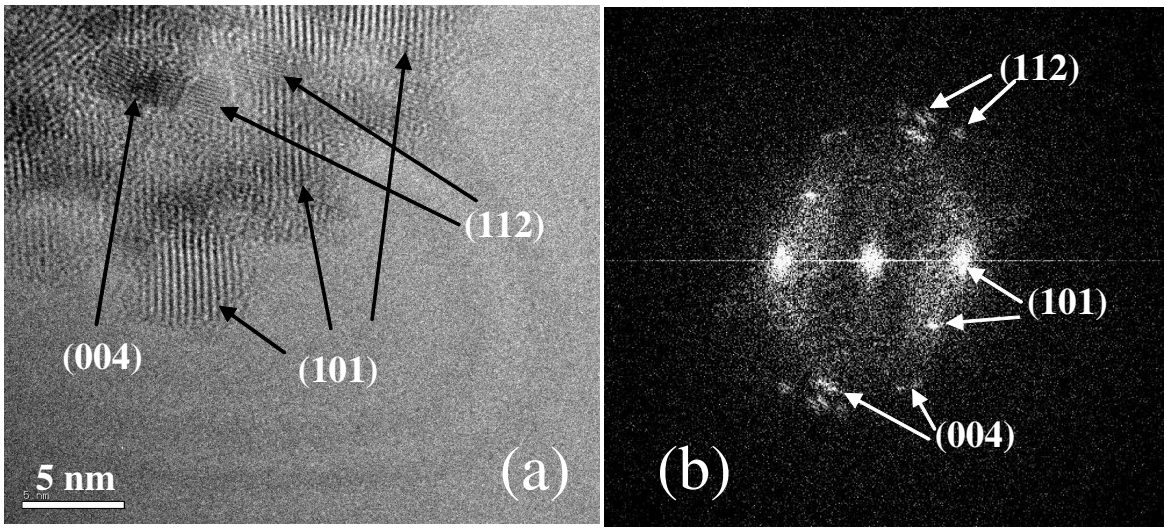

Fig. S3. (a) HRTEM image of ST-01 sample and (b) its SAED pattern obtained by Fourier-transform of the HRTEM image. ST-01 sample has spherical crystal morphology with a crystal size of about 5 nm. The SAED pattern shows diffraction spots of (101), (004), and (112) planes. In the HRTEM image, most of particles show the lattice image of (101) plane, and some particles show the lattice image of (004) or (112) plane. These facts reveal that ST-01 sample exposes various crystal planes on the crystal surface.