Electronic Supplementary Information (ESI)

Surface-Functionalized Monolayered Nanodots of a Transition Metal Oxide and Their Properties

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Structures of the precursor layered titanates

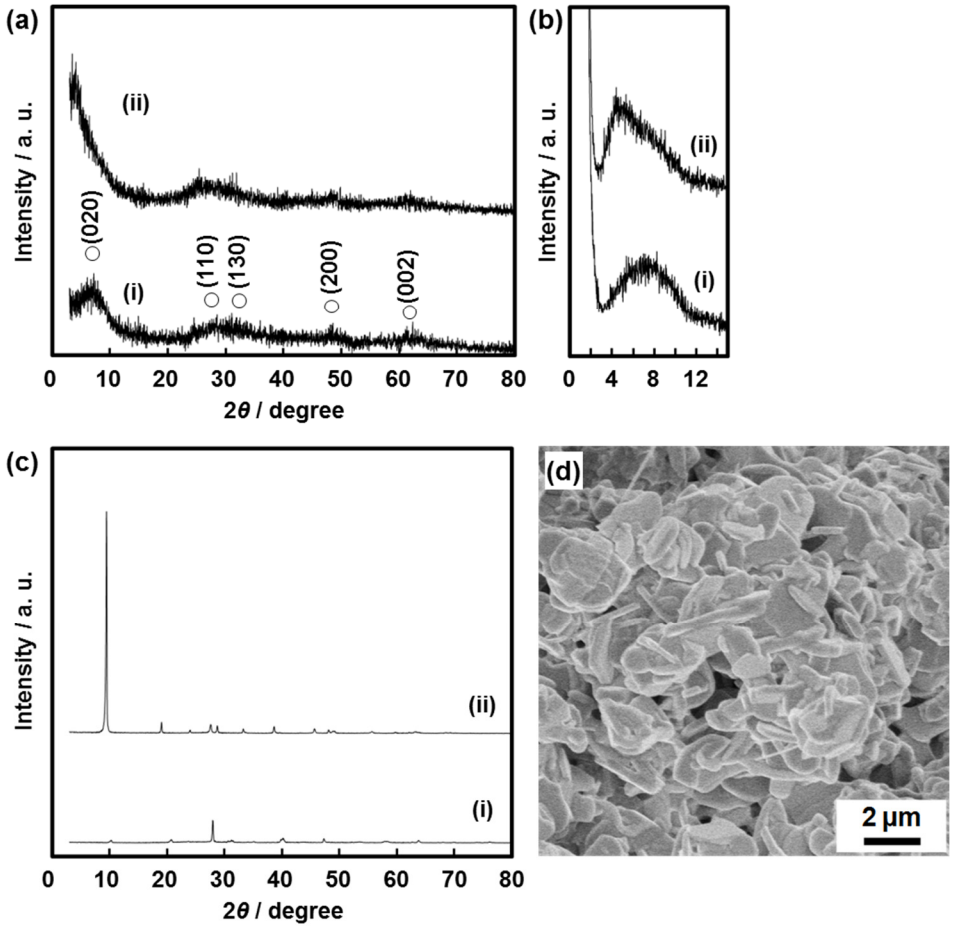

Fig. S1 XRD patterns (a,b) and FESEM images (c,d) of the precursor nanocrystals (a,b) and bulk crystals (c,d). In the panels (a,b), the spectra (i) and (ii) correspond to the Na-TiO_2 nanocrystals and H-TiO_2 after the protonation, respectively. In the pane (c), the spectra (i) and (ii) correspond to the bulk Cs-TiO_2 crystals and H-TiO_2 after the protonation, respectively.

The interlayer distances, namely those of the (020) planes, were shifted after the ion-exchange from the alkaline ions to proton (Fig. S1a,c).

UV-Vis spectra of the μm-TiO_2 and nm-TiO_2

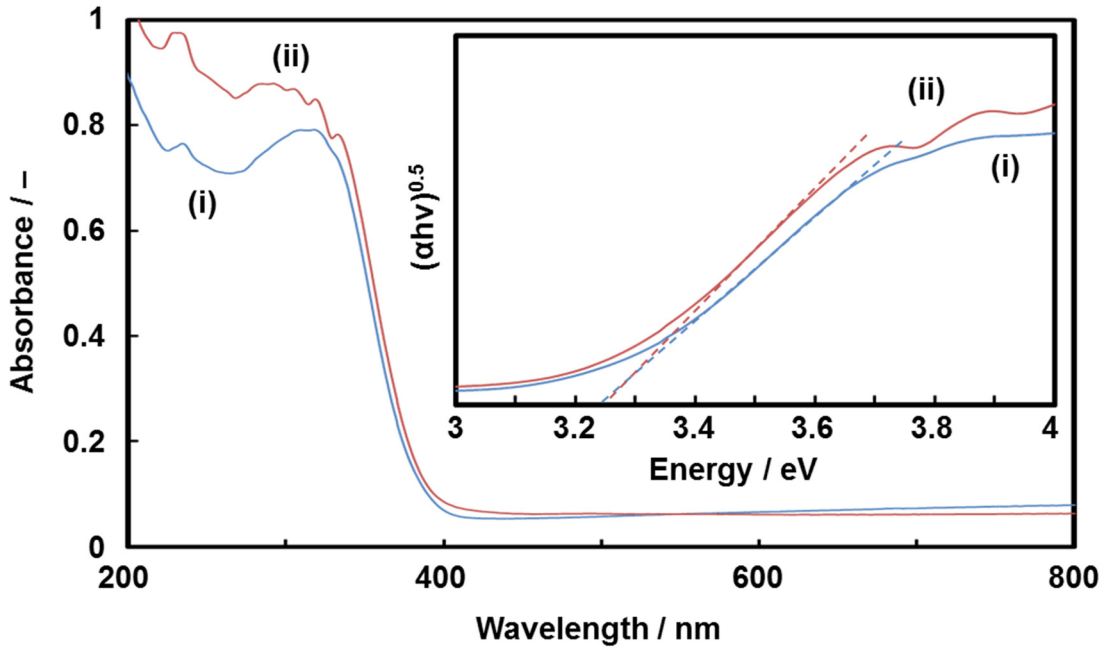

Fig. S2 UV-Vis spectra and their Tauc's plots (the inset) of the nm-TiO_2 (i) and μm-TiO_2 (ii).

The E_g of the μm-TiO_2 and nm-TiO_2 2–5 nm in size was estimated to be E_g=3.24 eV and E_g=3.25 eV, respectively. As mentioned in the main text, the effect of the lateral size reduction is calculated to be $\Delta E_{g,calc.}$=0.019–0.12 eV by the first term of the (eq. 1) on the assumption of $L_{x,y}$= 2.0–5.0 nm and $\mu_{x,y}$=1.63m_e as the reduced effective mass of bulk anatase titanium dioxide. In the present work, the experimental E_g of the nm-TiO_2 would have the slight deviations because of the reproducibility of size distribution and crystallinity resulting from the solution syntheses.