Supplementary Information

Self-organized ultrathin oxide nanocrystals

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I. Experimental Section

All chemicals were purchased from Aldrich and used without further purification. Organic solvents were dried at 120°C under vacuum before use. Nb_2O_5 NRs were obtained under similar conditions as the TiO_2 NRs by using $Nb(OC_2H_5)_5$ as a precursor. In a typical procedure, 0.4~0.5g of $Nb(OC_2H_5)_5$ were dissolved in a mixture of 16g of oleic acid and 18g of octadecene (or octadecane) under vigorous string at 80°C for 2h. 5~6g of oleylamine was added into this solution. The reaction was then heated at 260°~280°C for 2~4h. Finally, a whitish gel-like product was obtained in the bottom of the vessel. For the synthesis of ZnO and the lanthanide oxides, the corresponding acetates were used as precursors. 0.7~1.5g of the acetate precursor were dissolved in a mixture of 20~22g of oleylamine and 6g of oleic acid under vigorous string at 120°C for 6h. The solution turned from colorless to yellowish, which indicated the formation of the inorganic-organic complex. The yellowish transparent solution was heated at 260~300°C for more than 12h. Finally, the reaction was cooled to room temperature. The gel-like product could be directly collected from the bottom of the reaction vessel after removing the upper solvent.

Purities of the all as-obtained products are typically better than 95%. Size (in width) distributions of the nanorods and nanodisks are less than 10%. For nanorods, the lengths of corresponding ribbon superstructures range from 400nm~1μm. For nanodisk, the lengths are from 300nm~2μm.

Powder X-ray diffraction (XRD) patterns (low-angle) were recorded by a Siemens D5000 Powder Diffractometer with Cu K_α radiation (λ=1.5418Å). The operation voltage and current were kept at 40KV and 40mA, respectively. XRD patterns (high-angle) were carried out with a GADDS Hi-Star D8

diffractometer (Bruker) using Co K_α radiation (1.790 Å). XRD samples were prepared by depositing the precipitated samples on a silicon plate. The sizes and morphologies of the as-obtained nanocrystals were examined with a FEI Tecnai G2 S-Twin transmission electron microscope at an accelerating voltage of 200 kV and a Hitachi H9500 transmission electron microscope at an accelerating voltage of 300 kV. The samples were prepared by casting the dilute colloidal solution onto carbon-coated copper TEM grids. Energy dispersive X-ray Spectroscopy (EDS) measurements were performed with a Gatan parallel detection spectrometer attached to an electron microscope.

II Transmission Electron Microscopy images, Energy Dispersive X-ray Spectra, and Powder X-ray Diffraction patterns of Nb_2O_5, ZnO, and Eu_2O_3.

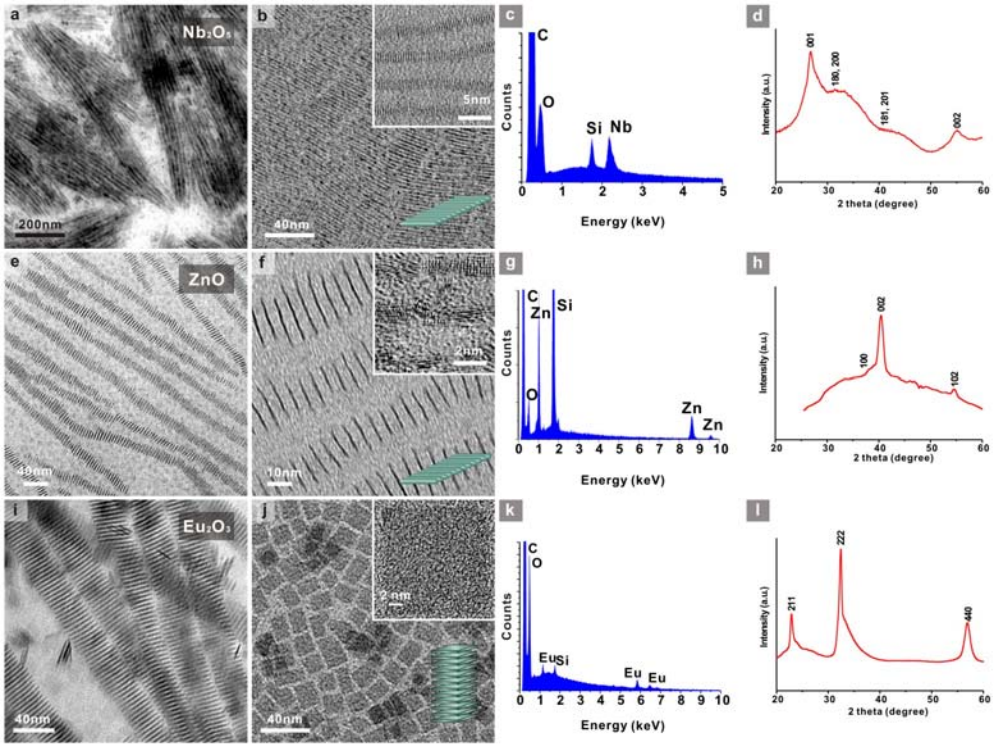

Figure S1 TEM images, EDS spectra, and XRD patterns of the as-prepared oxide nanocrystals; insets show the corresponding HRTEM images. (**a-d**), Nb_2O_5 NRs (JCPDF 30-0873); (**e-h**), ZnO NRs (JCPDF 36-1451); (**i-l**), Eu_2O_3 nanodisks (JCPDF 43-1008).

III Transmission Electron Microscopy images, Energy dispersive X-ray Spectra, and Powder X-ray diffraction patterns of rare earth oxides nanocrystals.

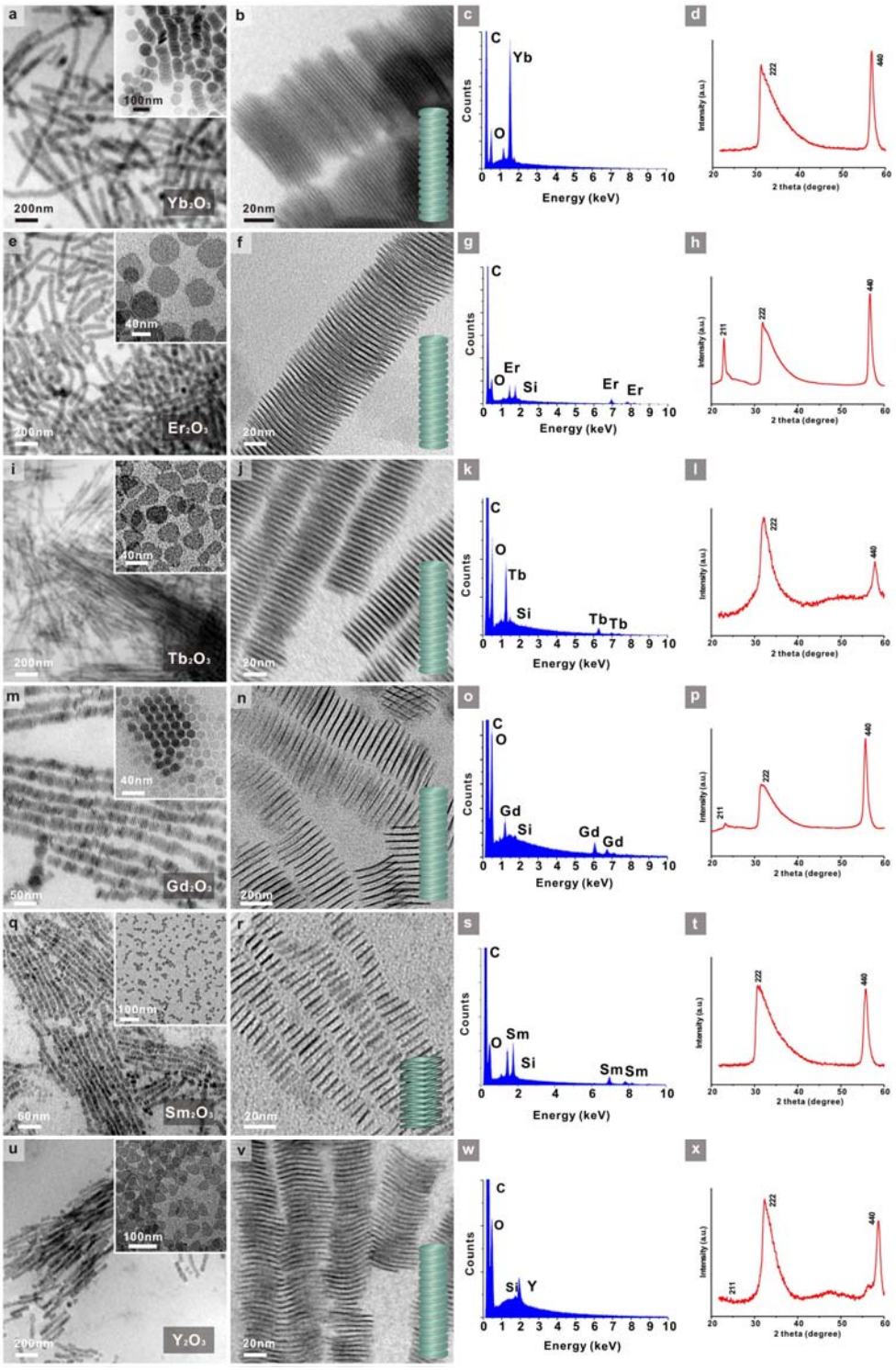

Figure S2. TEM images, EDS spectra, and XRD patterns of rare earth oxides nanocrystals (insets show the corresponding TEM images for

nanocrystals building blocks) **(a-d),** Yb_2O_3 (JCPDF 43-1037); **(e-h),** Er_2O_3 (JCPDF 43-1007); **(i-l),** Tb_2O_3 (JCPDF 43-1032); **(m-p),** Gd_2O_3 (JCPDF 43-1014); **(q-t),** Sm_2O_3 (JCPDF 43-1029); **(u-x),** Y_2O_3 (JCPDF 43-1036).

IV. Low-angle X-ray diffraction pattern for the initial metal (Gd)-surfactant mesostructures.