Supporting Information

Exfoliation of one-dimensional TiO_5 chain in K_2TiO_3

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1. XRD patterns for potassium titanates obtained from mixtures of KNO_3/TiO_2 in molar ratios of 2.0–2.3/1. Single phase K_2TiO_3 was obtained at a molar ratio of 2.2/1.

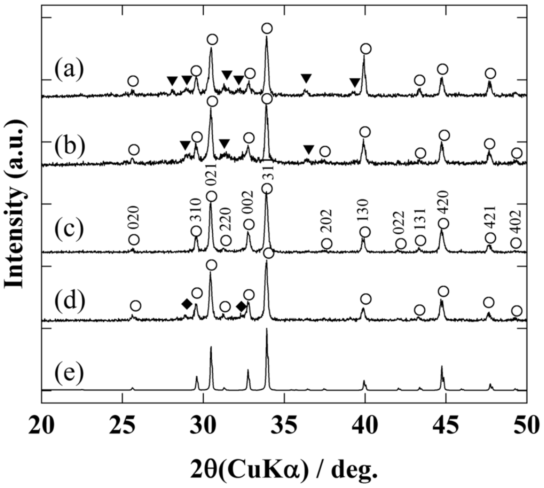

Fig. S1. XRD patterns for potassium titanate obtained from mixtures of KNO_3/TiO_2 in molar ratios of (a) 2/1, (b) 2.1/1, (c) 2.2/1, and (d) 2.3/1. Pattern (e) is a diffraction pattern calculated using crystallographic data for K_2TiO_3 [H. S. Khalsa, et al., *Mater. Res. Bull.*, 2009, **44**, 91-94]. Diffraction lines marked with open circles, filled triangles and diamonds were assigned to those of K_2TiO_3, $K_6Ti_4O_{11}$, and $K_6Ti_2O_7$, respectively.

2. SEM image of K_2TiO_3 obtained at K:Ti = 2.2:1 indicates agglomerates of small particles (<1 μm).

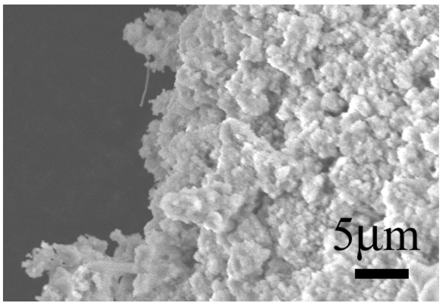

Fig. S2. SEM image of K_2TiO_3 powder.

3. After 3 days, the average particle size decreased from ca. 800 nm to 300 nm, and the zeta potential increased from 0 V to 30 mV for the K_2TiO_3/HNO_3(aq) colloidal solution.

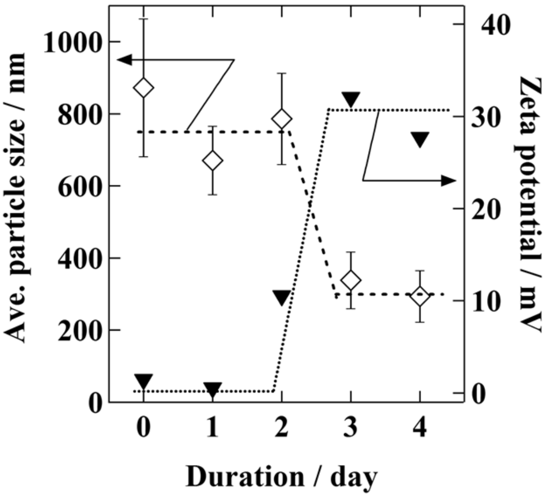

Fig. S3. Average particle size and zeta potential for the K_2TiO_3/HNO_3(aq) colloidal solution over time.

4. Potassium ion concentrations were analyzed by ICP-AES. 43.5 mg of as-prepared K_2TiO_3 powders (2.5×10^{-4} mol) were dispersed in 100 mL of 1M-HNO_3 solution. The solution was separated from the colloidal particle through a cellulose nitrate filter (0.1 μm pore size) after each duration time. The saturated K^+ concentration was slightly higher than the starting material, maybe due to the K-rich composition of the starting mixtures and experimental error (weigh-in in a glove box). The line was drawn to represent the concentration change, excepting the value at 0 day because of insufficient equilibrium reaction in very short duration time.

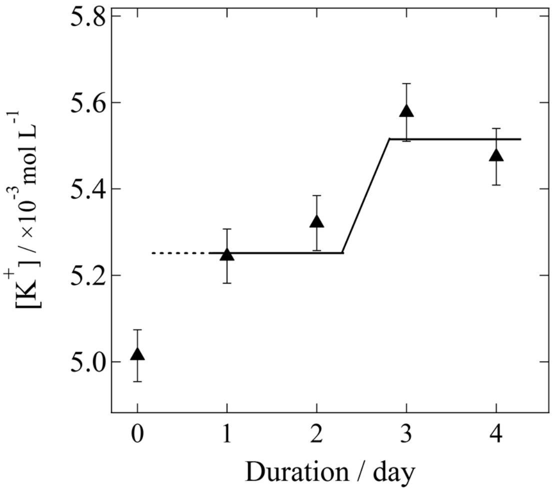

Fig. S4. Potassium concentration of the colloidal solution dependent on duration time.

5. X-ray absorption spectra were measured for K_2TiO_3 and K_2TiO_3 in nitric acid solution to elucidate the local structure around Ti^{4+} in the colloidal solution. The strong pre-edge peak at 4969 eV for the colloidal solution implies that Ti^{4+} in the solution have distorted octahedral coordination with additional hydronium ions.

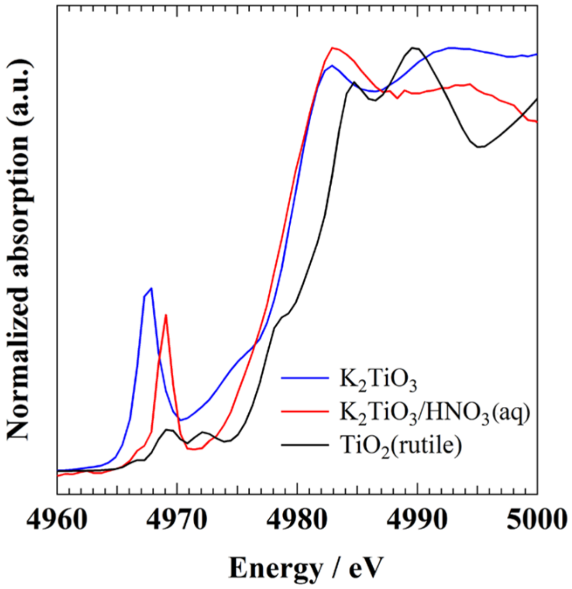

Fig. S5. Ti K-edge XANES spectra of K_2TiO_3 and K_2TiO_3 in nitric acid solution. The spectrum of TiO_2 (rutile) is also shown for reference.