

Supporting online information for

**"An Open-Bench Method for the Preparation of BaTiO<sub>3</sub>, SrTiO<sub>3</sub> and  
Ba<sub>x</sub>Sr<sub>1-x</sub>TiO<sub>3</sub> nanocrystals at 80 °C "**

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**Section 1. Experimentals:**

**1. Representative experimental procedure for the synthesis of Ba<sub>0.7</sub>Sr<sub>0.3</sub>TiO<sub>3</sub>  
nanocrystals**

All chemicals were purchased from Aldrich. In a typical synthesis, 6.39 g of hydrochloric acid (37%) solution containing 47% of TiCl<sub>4</sub> (99.9%) and 15mL deionized (DI) water were mixed and used as the aqueous phase, and cyclohexane (99%, 23g) as the oil continuous phase. Triton X-100 (laboratory grade, 25g) and n-butanol (99.4%, 28g) were selected as the emulsifier and co-emulsifier respectively. The solutions were then transferred to a 500ml flask equipped with a stirrer, a thermometer, a dropping funnel and a reflux condenser. With stirring, a 40%NaOH (97%) solution was added dropwise into the flask until pH=7. A 25ml DI water

solution with 2.13g (8.72mmol) of  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  (99%) and 0.9966g (3.74mmol) of  $\text{SrCl}_2 \cdot 2\text{H}_2\text{O}$  (99%) was then added to the flask dropwise under continuous stirring. Additional 40%NaOH aqueous solution was then added dropwise into the system until  $\text{OH}^-/\text{Ti}^{4+}=2/1$ . This reaction system was then kept at 78-80°C for 3 hours prior to centrifugation at 4000rpm on a Marathon 13K model instrument for 15min. The resulting sediment was redispersed in DI water using an ultrasonic bath. This centrifugation-redispersion cycle was repeated at least three times to remove emulsifiers and other ionic impurities. The final particles were dried in vacuo at 80 °C over night.

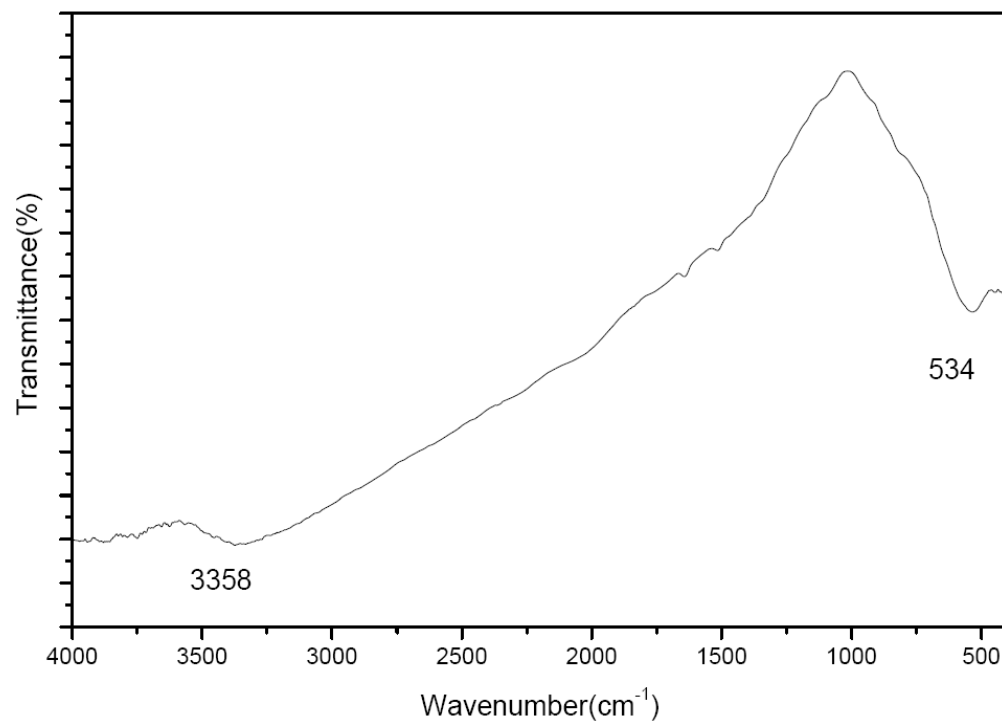
In the preparation of BST of different sizes, the amount of oil phase, emulsifier and co-emulsifier were kept constant, and all aqueous contents were varied by a factor of either 0.5 or 0.25. It should be noticed that the concentration of all the aqueous solutions and the procedures of the preparation were the same as described in the first paragraph.

## **2. Characterizations**

The dried BST powders were characterized by X-ray diffraction (XRD, Philips PW3040) for crystalline phase determination. Transmission electron microscope (TEM, JOEL 1200 EX) and electron diffraction at an acceleration voltage of 100 kV were used to characterize the morphologies and crystalline structures of BST solid solutions. EDS studies were conducted on a LEO 1530 electron microscope combined with an Inca EDS Microanalysis Systems (Oxford Instruments). The dielectric constant measurements were conducted on a Novocontrol BDS 80 high-resolution broadband dielectric spectrometer with a sample holder cell (diameter: 19.21mm; thickness: 0.27mm).

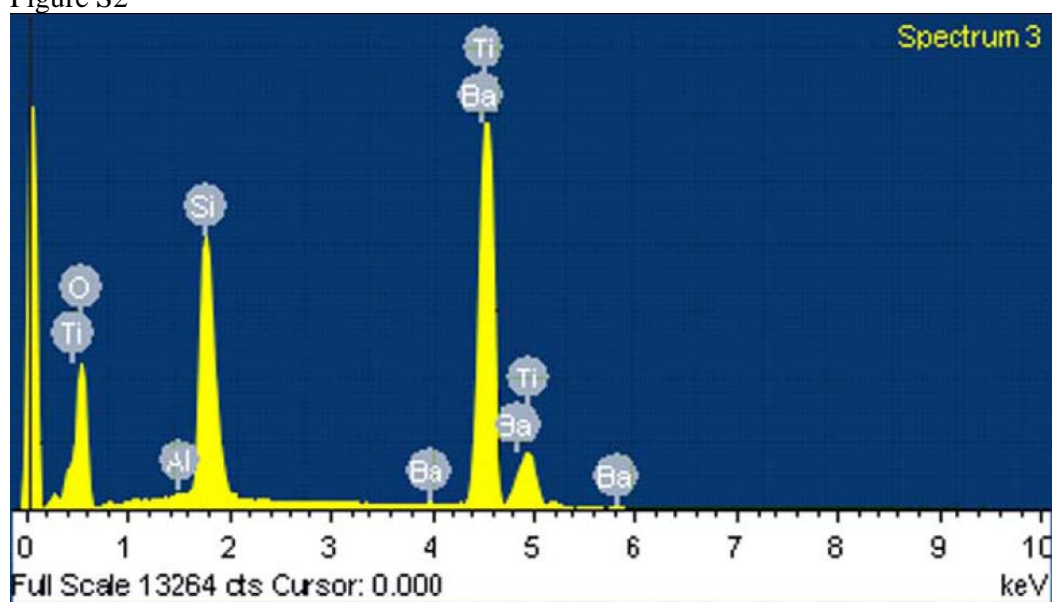
## Section 2. Figures

Figure S1



**Figure S1.** FTIR spectrum of STO nanocrystals.

Figure S2



**Figure S2.** EDS spectrum for BTO nanocrystals. Si signal is from the silicon wafer supporting substrate.