Electronic Supplementary Information

Experimental detail

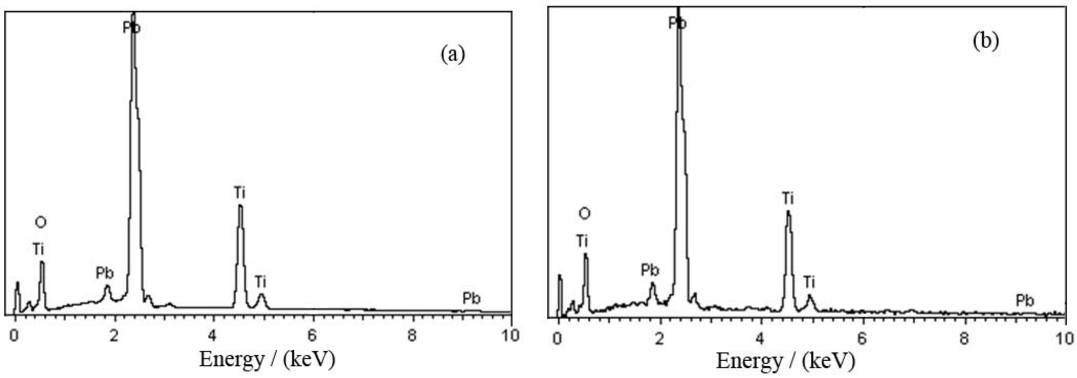
The hydrothermal reaction was carried out in a homemade Teflon-lined stainless-steel autoclave. All chemicals of analytical grade were used as received without any further purification.

A typical synthesis experiment starts with dissolving 1.99 g $Pb(NO_3)_2$ in 10 mL distilled water. Whilst stirring, the prepared $Pb(NO_3)_2$ transparent solution was added to ammonia solution drop by drop to obtain lead hydroxide precipitates. After washing and filtering with distilled water for six times, the prepared lead hydroxide precipitates were dispersed in a distilled water under vigorous magnetic stirring, followed by the addition of 0.47 g P25-TiO_2 powders, 2.244 g KOH pellets, and 13.6 g $NaNO_3$ crystals, which form a suspension. After continuous stirring for 2 h, the suspension as feedstock was poured into a 50 ml Teflon-lined stainless-steel autoclave for hydrothermal treatment. In the final feedstock suspension, a KOH concentration of 1 mol/L and a $NaNO_3$ concentration of 4 mol/L were created. The autoclave was sealed and maintained at 200 ^oC for 16 h, and then cooled to room temperature in air. The resultant products were filtered and washed with distilled water and absolute ethanol for several times. The resultant white powder was oven-dried in air at 80 ^oC for 12 h. In order to investigate the formation mechanism of the $PbTiO_3$ nanosheets, a reference $PbTiO_3$ powder was also synthesized via a similar hydrothermal route by introducing KNO_3 and $LiNO_3$ as additives into the hydrothermal system instead of $NaNO_3$, respectively.

The chemical composition of the $PbTiO_3$ samples has been determined by chemical analysis using inductively coupled plasma-atomic emission spectroscopy (ICP-AES). The composition of the $PbTiO_3$ samples varies slightly from batch to batch. The ratio of Pb to Ti can vary from 0.98:1 to 1:1.

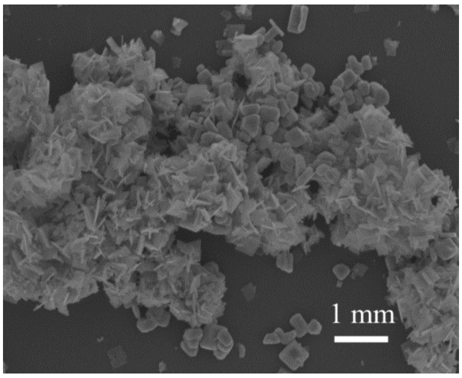
X-ray diffraction was performed on a Rigaku X-ray diffractometer (XRD) with high-intensity CuKα radiation (λ=1.5406 Å) and step interval of 0.02 as well as scanning speed of 4 ^{o}/min. Field emission scanning electron microscopy (FESEM) images were taken with a Hitachi SU-70 scanning electron microscope. Transmission electron microscopy (TEM) images and selected area electron diffraction (SAED) patterns were obtained with JEOL 200CX TEM using an acceleration voltage of 100 kV. High-resolution TEM (HRTEM) images were taken with a JEOL-2010 HRTEM using an acceleration voltage of 200 kV.

Fig. S1 EDS spectrums caught from the single whole PbTiO3 nanosheet dominant with (a) (001) facets, and (b) (111) facets by the energy dispersive spectroscope attached with the JEOL 200CX TEM



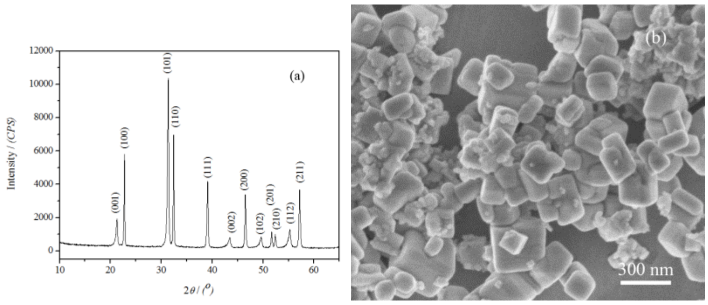
The corresponding EDS spectrums (Fig. S1) indicate that the PbTiO3 nanosheets consist of Pb, Ti, and O with a ratio of about 1:1:3, agreeing well with the nominal composition of PbTiO3.

Fig. S2 An overview SEM image of the hydrothermally synthesized samples assisted with $NaNO_3$ additives.



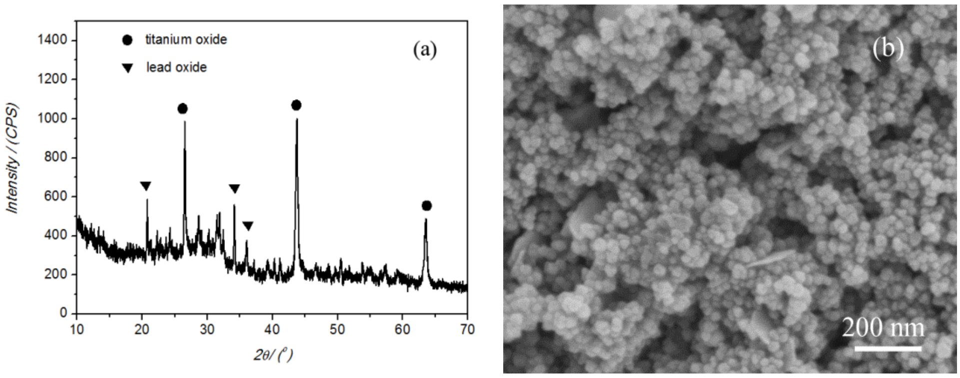
An overview SEM image reveals that the samples hydrothermally synthesized assisted with $NaNO_3$ additives consist of nanosheets and cubic crystals with faint edges. Obviously, the addition of $NaNO_3$ induces a lot of $PbTiO_3$ perovskite nanosheets

Fig. S3 (a) XRD pattern and (b) SEM image of the hydrothermally synthesized samples assisted without any $NaNO_3$ additives.



The XRD pattern and the SEM images indicate that as the hydrothermal synthesis is carried out without any $NaNO_3$ additive the synthesized $PbTiO_3$ samples are of cubic particles with faint facets.

Fig. S4 (a) XRD pattern and (b) SEM image of the obtained samples in the presence of $LiNO_3$ additives after hydrothermal treatment.



The XRD pattern indicates that due to the $LiNO_3$ addition after hydrothermal treatment few tetragonal $PbTiO_3$ perovskite phase is checked out from the obtained samples. Moreover, the obtained samples are composed of nanoparticles with a size of about 40-50 nm. It is evident that the addition of $LiNO_3$ effectively inhibits the formation of $PbTiO_3$ perovsites, displaying different effect with the addition of $NaNO_3$ and KNO_3