

## Supplementary Information

### **Enhanced Polarization and dielectricity in BaTiO<sub>3</sub>:NiO nanocomposite films modulated by the microstructure**

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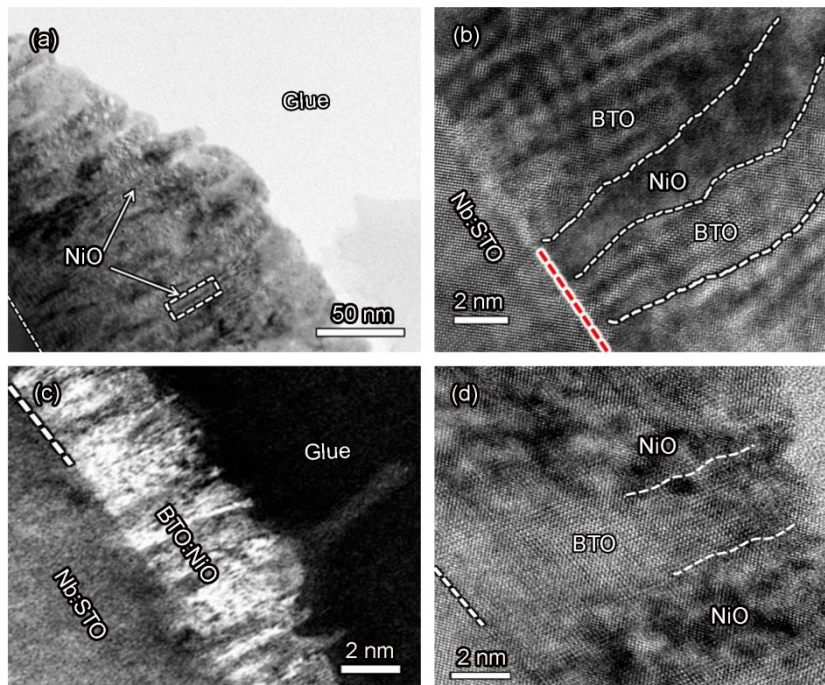
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**Table S1. Deposition parameters and their levels**

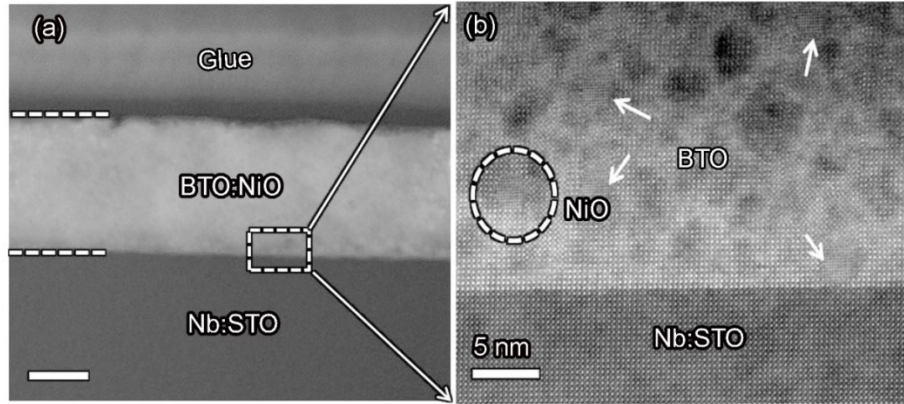
| Factors                                  | levels   |
|--|--|
| Substrate                                | Nb:SrTiO <sub>3</sub> with 0.7 wt % of Nb, abbreviated as Nb:STO |
| Substrate temperature(°C)                | 630  |
| O <sub>2</sub> gass pressure (mbar)      | 0.2  |
| Target-substrate distance (mm)           | 35   |
| Laser fluence (J/cm <sup>2</sup> )       | 1.2  |
| Laser frequency (J/cm <sup>2</sup> , Hz) | 2  |

**Table S2. Targets parameters and their synthesized materials**

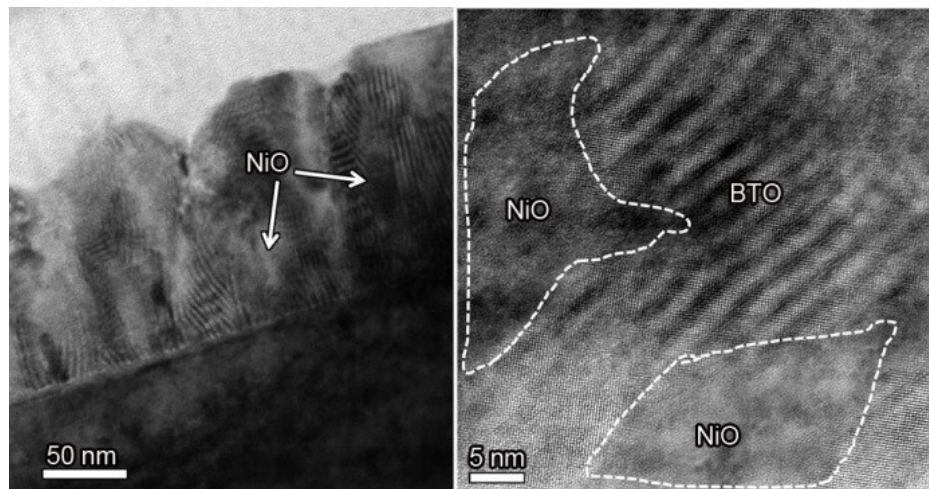
| Target   | Powers of materials      |
|--|--------------------------|
| (BaTiO <sub>3</sub> ) <sub>0.9</sub> :(NiO) <sub>0.1</sub> , abbreviated as (BTO) <sub>0.9</sub> :(NiO) <sub>0.1</sub> | BaTiO <sub>3</sub> , NiO |
| (BaTiO <sub>3</sub> ) <sub>0.8</sub> :(NiO) <sub>0.2</sub> , abbreviated as (BTO) <sub>0.8</sub> :(NiO) <sub>0.2</sub> | BaTiO <sub>3</sub> , NiO |
| BaTiO <sub>3</sub> , abbreviated as BTO  | BaTiO <sub>3</sub>       |
| NiO  | NiO                      |



**Figure S1.** (a) TEM and (b) and(d) HRTEM images for the BTO:NiO with nanomultilayers structure for the film C-2. (c) HADDF images for the films of C-2.



**Figure S2.** STEM and HR-STEM images for the BTO:NiO with nanogranular structure of the sample G-1.



**Figure S3.** TEM and HRTEM images for the BTO:NiO with nanogranular structure for the film G-2.