

Supplementary Information for

Effect of Nb-concentration on the spin-orbit coupling strength in Nb-doped SrTiO₃ epitaxial thin films

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S1. Thin film growth and structural characterization

Nb:STO concentration split films were fabricated at 700 °C in 10⁻⁵ Torr of oxygen partial pressure using pulsed laser epitaxy (PLE). Laser (248 nm; IPEX 864, Lightmachinery, Nepean, Canada) fluence of 1.5 J/cm² and repetition rate of 5 Hz was used. SrTiO₃ and Sr(Nb_{0.2}Ti_{0.8})O₃ targets were used to systematically modify the Nb:STO concentration, by controlling the ablation ratio between the two targets within a unit cell thickness. The advantage of using co-ablation of two targets instead of using Nb:STO solid solution target with different n_{Nb} was to avoid additional complexity and quality issues due to preparing distinctive targets. The thickness of the Nb:STO thin films was 16 ± 1 nm, as measured by X-ray reflectometry (XRR). The atomic structure and epitaxy relation of the thin films were characterized using high-resolution X-ray diffraction (XRD) (Rigaku, Smartlab).

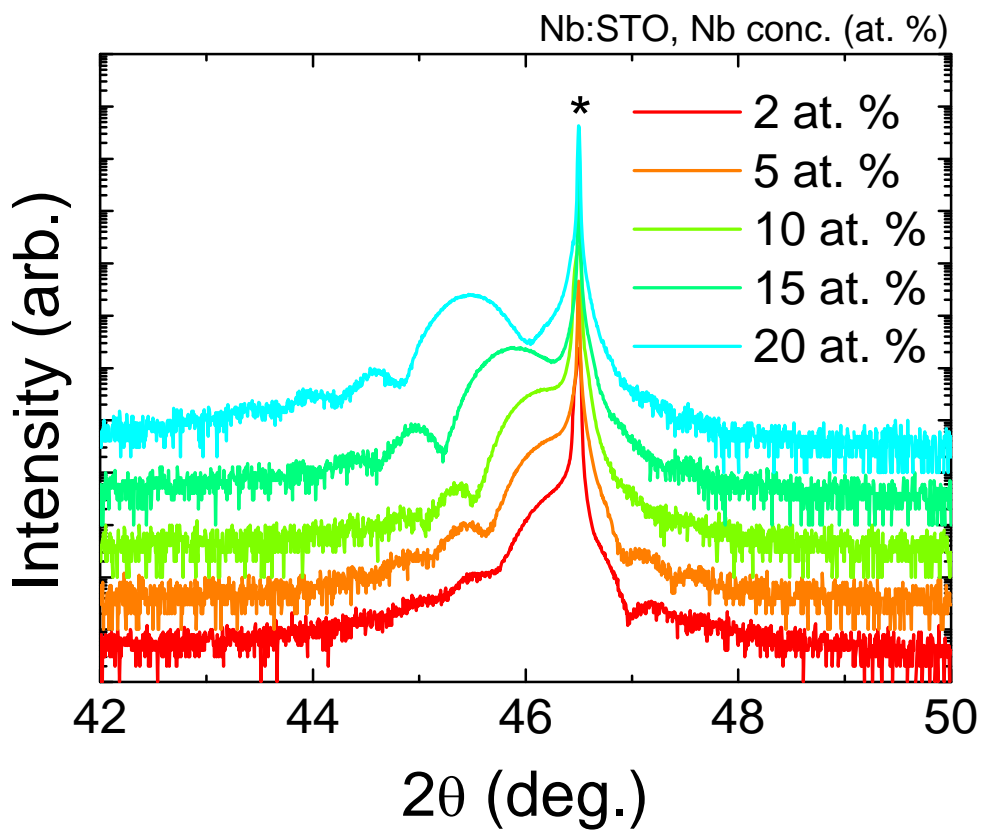


Figure S1. XRD θ - 2θ scans for Sr(Nb_xTi_{1-x})O₃ thin films on SrTiO₃ substrates.