

Effect of Different Defect Dipoles on the Polarization

Mechanism of Nb-Doped SrTiO₃ Single Crystals

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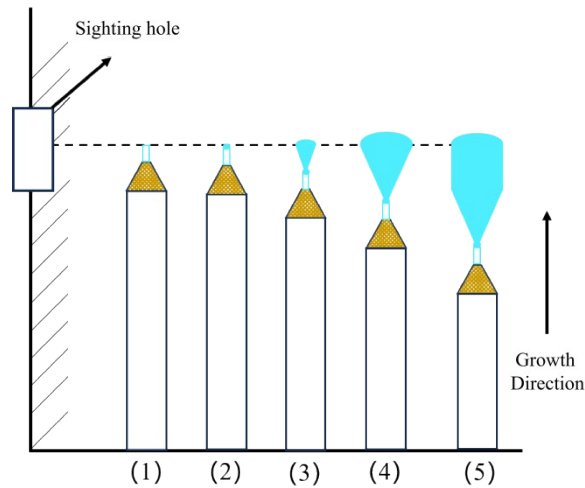


Fig. S1 Schematic diagram of the crystal growth process

The details of the specific process: First, the furnace was preheated with a hydrogen flow rate of 16 L/min and an oxygen flow rate of 5 L/min. A seed crystal was then placed and gradually raised to the observation hole position. During this process, the oxygen flow rate was gradually increased until the top of the seed crystal melted. Subsequently, the feeding system and crystal dropping device were activated. The powder melt fell onto the seed crystal, and once a distinct solid-liquid interface appeared, the H_2 and O_2 flow rates were simultaneously increased to initiate crystal shoulder expansion. After the crystal grew to the desired size, the H_2 and O_2 flow rates were maintained constant to sustain isometric growth. Finally, when the crystal reached the ideal length, the gas valves and feeding system were turned off, and the furnace was insulated to prevent cracking caused by rapid cooling. Throughout the entire process, the feeding rate and crystal dropping rate were carefully controlled to ensure slow descent of the crystal, and the horizontal position of the crystal was continuously adjusted to maintain a stable solid-liquid interface.

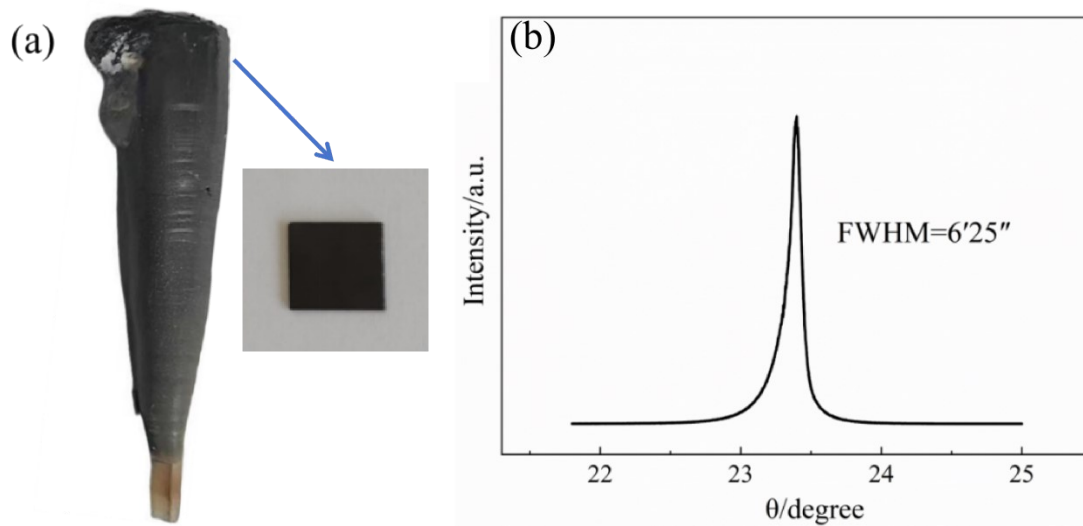


Fig. S2 The physical and rocking curve of $\text{SrNb}_{0.5}\text{Ti}_{99.5}\text{O}_3$ single crystal