

Abstract Submitted
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Effects of heat treatments on defects in strontium titanate substrates for magnetoelectric multiferroics¹ BRIAN LASSITER, University of Idaho, MARY ELLEN ZVANUT, University of Alabama, Birmingham — SrTiO₃ (STO) shows potential as a substrate for deposition of thin film multiferroic devices; however, there is little research on the effects of heat treatments under ambient conditions and temperature ranges where deposition typically occurs. To this effect, defects in STO are analyzed using electron paramagnetic resonance (EPR) at room temperature after anneals in the temperature range 200-500 ° C in argon, oxygen, and vacuum. These conditions are similar to those used in the deposition of bismuth ferrite (BFO), which are thought to have enhanced ferroelectric properties. Three different defects, common in bulk STO, are observed in the as-received substrates: Fe⁺³, Cr⁺³, and a proposed Fe⁺³V_O complex. The data trends show Cr³⁺ decreasing during oxygen anneals, Fe³⁺ remaining negligibly affected for most cases, and Cr³⁺ and Fe³⁺V_O increasing between 2 to 5 times during vacuum anneals. The increase in Fe³⁺V_O supports the conclusion that there is considerable in-diffusion of oxygen occurring during the vacuum anneals, but higher temperature may be required to replace the oxygen and fill the vacancy.

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