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Niobium doped strontium titanate: Effect of oxygen ambient on the doping mechanism CHUN-FU CHANG, National Sun Yat-Sen University, Taiwan, Q.Y. CHEN, National Sun Yat-Sen University, Taiwan; University of Houston, USA, P.V. WADEKAR, University of Liverpool, UK, O. LOZANO, University of Namur, Belgium, M.S. WONG, National Dong-Hua University, Taiwan, W.C. HSIEH, Y.S. WANG, Y.T. LIN, H.H. LIU, C.W. CHANG, H.C. HUANG, National Sun Yat-Sen University, Taiwan, H.H. LIAO, Enli Technology, Taiwan, W.K. CHU, University of Houston, USA, H.W. SEO, University of Arkansas, USA — Double doping in oxides, a scenario where free electrons are created to anion doping as well as oxygen vacancies is currently under investigation for perovskite such as La:SrTiO3-δ in hopes of attaining materials with high mobility for transparent oxide electronics. In this report, we have investigated this phenomenon in another prominent conducting perovskite – Nb:SrTiO3. Nb doped SrTiO3 thin films were grown under different oxygen pressures to control the oxygen dopant effect. The chemical quantification was done by proton-induced X-ray emission (PIXE) and X-ray photoelectron spectroscopy (XPS) techniques, while structural quantification was done by X-ray diffraction (XRD). Electrical measurements show that conductivity is strongly dependent on the oxygen partial pressures rather than Nb doping which is contradictory to the expectations. This discrepancy arises because of formation of multivalent Nb due to the processing conditions. The knowledge of interplay between the doping themselves and with the inherent atomic defects is essential to understand and ultimately tune the electrical and optical properties for transparent electronic applications.

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