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Evidence of the oxygen vacancies-induced room temperature ferromagnetism in multiferroic Co-doped LiNbO₃ films

Jiixin Ye¹, Xianke Sun¹, Zhonghua Wu², Jiwen Liu¹, Yukai An^{1*}

¹Key Laboratory of Display Materials and Photoelectric Devices, Ministry of Education; Tianjin Key Laboratory for Photoelectric Materials and Devices; National Demonstration Center for Experimental Function Materials Education; School of Material Science and Engineering, Tianjin University of Technology, Tianjin 300384, China

²Beijing Synchrotron Radiation Facility (BSRF), Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 1040049, China

ABSTRACT

Local Co structures and magnetic properties of the Co-doped LiNbO₃ films deposited by RF-magnetron sputtering have been systemically studied by different experimental techniques. The detailed structural analysis using XRD, XPS, XANES and EXAFS as well as full multiple-scattering *ab initio* theoretical calculations of Co K-edge XANES spectra show that the doped Co ions substitute for the Li sites of the LiNbO₃ lattice with +2 oxidation state and form Co_{Li}+V_O complexes with oxygen vacancies in the nearest coordination shell of Co. No extra impurity peaks, such as Co metal clusters and Co oxide secondary phases were observed with the XRD detection limit. All the Co-doped LiNbO₃ films display obvious room temperature (RT) ferromagnetism with a Curie temperature of about 630K. The saturation magnetic

*Corresponding author should be addressed: E-mail: ykan@tjut.edu.cn; jwliu@tjut.edu.cn. Fax: +86 02260214028

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