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I.M. Dildar, D.B. Boltje, M.B.S. Hesselberth, C. Beekman, J. Aarts

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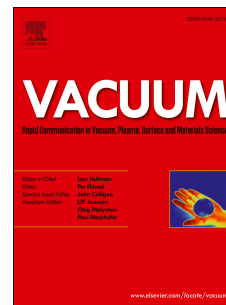
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Mitigating target degradation in sputtering manganite thin films

I. M. Dildar,^{1, a)} D. B. Boltje,¹ M. B. S. Hesselberth,¹ C. Beekman,^{1, b)} and J. Aarts¹

Kamerlingh Onnes Laboratorium, Leiden University, The Netherlands

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In this paper, we address the issue of aging of oxide sputtering targets, using the example of $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ (LCMO), a material which is quite sensitive to the amount of oxygen. After prolonged use we find that the morphology of the films becomes poor: holes appear, the size of the steps between terraces becomes larger, the roughness increases, and electrical conductance in the metallic state at temperatures below the metal-insulator transition becomes smaller. We have performed experiments on reactive sputtering with water vapor in order to reverse their degradation. We discuss the growth and properties of films of LCMO on flat SrTiO_3 substrates before and after the target treatment. We study both the morphological and structural changes in these films as well as the transport properties. The results indicate that a correct concentration of oxygen in the targets is important, and that a deficiency can be compensated by the water treatment, thus increasing the usable life time of targets.

Key Words: epitaxial growth; sputtering; atomic force microscopy (AFM); heterostructures

^{a)}E-mail:ishratmubeen@gmail.com; present address: Department of Physics, University of Engineering and Technology, Lahore, Pakistan

^{b)}present address: Department of Physics, Florida State University, Tallahassee, USA

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