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Strain Evolution with Thickness of TbMnO3/ (001) SrTiO3-TiO2 term. Epitaxially-strained Thin Films

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Strain in multiferroic rare-earth epitaxial layers is a key feature that can induce new functionalities for the next generational applications such as room-temperature magnetoelectricity and magnetocapacitance [1, 2]. Several studies have shown the modulation of strain in TbMnO3 (TMO) thin films as a promising route for fabrication of perovskite-type oxides with tunable electrical and magnetic properties.

This work explores the evolution of strain in TMO thin films grown epitaxially on (001) SrTiO3-TiO2 term. single crystal substrates using ultra-high vacuum pulsed laser deposition technique. In-situ monitoring of the film growth by using reflective high-energy electron diffraction (RHEED) have shown the formation of Kikuchi lines which verified the film orientation in (001) for the TiO2 terminated SrTiO3 substrate. The film quality and variation of strain as a function of thickness were investigated using X-ray diffraction and X-ray reflectivity. A rocking curve of the (002) peak further confirms the high crystalline quality of the films. Further analysis of the X-ray diffraction patterns confirm successful growth of single-phase c-axis-oriented epitaxial TMO films with an orthorhombic structure. Quantitative strain analysis has shown reduction of strain with increasing thickness.

Keywords: Multiferroic, perovskite, epitaxial growth

References

[1] G. Panomsuwan and N. Sait, *Cryst. Res. Technol.* 2018, 53, 1700211
[2] V. Goian *et al, COMMUNICATIONS MATERIALS*, (2020) 1:74

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

Primary author: Mr MWENDWA, Geoffrey (School of Physics, Material Physics Research Institute, University of the Witwatersrand, Johannesburg, South Africa)

Co-authors: Prof. WAMWANGI, Daniel (School of Physics, Material Physics Research Institute, University of the Witwatersrand, Johannesburg, South Africa); Dr KOTANE, Lesias (School of Physics, Material Physics Research Institute, University of the Witwatersrand, Johannesburg, South Africa); Prof. ERASMUS, Rudolph (School of Physics, Material Physics Research Institute, University of the Witwatersrand, Johannesburg, South Africa); Prof. RADOVIĆ, Milani (Photon Science Division, Paul Scherrer Institute, Villigen, Switzerland); Prof. DIL, Hugo (Institut de Physique, École Polytechnique Fédérale de Lausanne, Switzerland); Prof. BILLING, Dave (School of Chemistry, Molecular Sciences Institute, University of the Witwatersrand, Johannesburg, South Africa); Mr SHNIER,

Adam (School of Chemistry, Molecular Sciences Institute, University of the Witwatersrand, Johannesburg, South Africa); Dr MADHUKU, Morgan (iThemba LABS (Gauteng), Johannesburg, South Africa)

Presenter: Mr MWENDWA, Geoffrey (School of Physics, Material Physics Research Institute, University of the Witwatersrand, Johannesburg, South Africa)

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