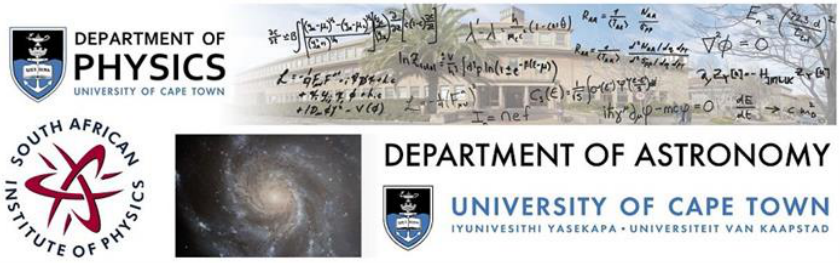

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Role of swift heavy ion irradiation on structural and magnetic properties of Ti_{0.95}Co_{0.05}O_{2-δ} epitaxial thin films

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Abstract content
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Defects like oxygen vacancies are found to play a vital role in deciding the physical and magnetic properties of Ti_{0.95}Co_{0.05}O_{2-δ} [1-3]. These defects can be created during growth or may be induced by ion irradiation. The role of such defects by depositing non-stoichiometric polycrystalline films, as well as by irradiating with swift heavy ions on structural and magnetic properties have been reported [4, 5]. In this work, the structural and magnetic properties of epitaxial thin films under dense electronic excitation are discussed. Films were deposited by pulsed laser deposition technique and the oxygen partial pressure during growth was kept at 10 mTorr. Reflections, beside those corresponding to the planes (004) and (008) of anatase phase of TiO₂, are suppressed indicating epitaxial growth of the films along c-axis. In view of the important role of defects in manifestation of physical properties, films have been irradiated with 100 MeV Ag⁷⁺ ions with different fluences. X-ray diffraction of the irradiated films indicates successive amorphization of the films with increasing ion dose. The magnetic measurements indicate a significant enhancement of the magnetization of the film irradiated with fluence 1 × 10¹³ ions.cm⁻². This unexpected increase in magnetization is explained on the basis of bound magnetic polaron (BMP) model. The findings suggest the pivotal role of ion irradiation on tailoring structural as well as magnetic properties.

References
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[5] Mohanty P et al. 2014 J. Phys. D: Appl. Phys. 47 315001

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