

Abstract Submitted
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No role of magnetic impurities in observed ferromagnetism in $\text{Ti}_{1-x}\text{Ta}_x\text{O}_2$ thin film¹ MALLIKARJUNA RAO MOTAPOTHULA, Graduate Student, A. ROY BARMAN, N.L. YAKOVLEV, S. DHAR, M.B.H. BREESE, T. VENKATESAN, NANOCORE, NATIONAL UNIVERSITY OF SINGAPORE TEAM, CIBA, DEPARTMENT OF PHYSICS, NATIONAL UNIVERSITY OF SINGAPORE COLLABORATION, ELECTRICAL AND COMPUTER ENGINEERING, NATIONAL UNIVERSITY OF SINGAPORE COLLABORATION — Recently, the idea of cationic-vacancy-induced FM in wide band-gap semiconducting oxides was proposed on theoretical grounds. Experimentally, we observed ferromagnetism in thin films of anatase $\text{Ti}_{1-x}\text{Ta}_x\text{O}_2$ grown by PLD. Ta incorporation gives rise to cationic defects, acting as magnetic centers and free charge carriers as detected by various spectroscopic and transport measurements. To confirm that the ferromagnetism is an intrinsic property of $\text{Ti}_{1-x}\text{Ta}_x\text{O}_2$ and to rule out any impurity issues such as presence of magnetic elements and clustering, we carried out in-depth analysis based on Rutherford backscattering spectroscopy (RBS), Proton induced X-Ray Emission spectroscopy (PIXE) and Secondary Ion Mass Spectroscopy (SIMS). From these results we concluded that the observed FM was not due to magnetic impurities. Rather it is an intrinsic property of $\text{Ti}_{1-x}\text{Ta}_x\text{O}_2$ thin film.

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