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Room temperature ferromagnetism in undoped TiO_2 films P. KHAREL, C. SUDAKAR, J. THAKUR, G. LAWES, R. NAIK, Wayne State University, V.M. NAIK, University of Michigan,Dearborn, R. SURYANARAYANAN, Universite Paris-Sud,France — We have prepared thin films of undoped TiO_2 having rutile and anatase structures, using both spin coating and sputter deposition techniques, on sapphire and quartz substrates. The structural characteristics of the films have been investigated using Raman spectroscopy and transmission electron microscopy (TEM). We found that the annealing condition strongly influences the magnetic properties of the films. When annealed in high vacuum, all films demonstrate room temperature ferromagnetism (FM) whereas air annealed samples show insignificant FM. The ferromagnetic moment in vacuum-annealed samples stored under ambient conditions was not stable, but decayed on a time scale of hours. The sample magnetization was found to depend on the film thickness; the saturation magnetic moment was observed to decrease with increasing film thickness. These results suggest that FM in $TiO_{2-\delta}$ films is mediated by surface oxygen defects. The details of Raman and TEM studies will be presented and the appearance of FM on vacuum annealing will be discussed.

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