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Magnetism of TiO and TiO₂ Clusters XIAOHUI WEI, RALPH SKOMSKI, B. BALAMURUGAN, Z. SUN, University of Nebraska, D.J. SELLMYER, UNIVERSITY OF NEBRASKA TEAM — Ferromagnetism in wide-bandgap semiconductors has sparked interest due to its potential applications in spintronic devices¹. Previous research has focused on doped TiO₂ thin films, with little work on undoped TiO₂ and no report on TiO clusters. To investigate the magnetism of small TiO_x particles, TiO₂ and TiO clusters with sizes from 15 to 50 nm were produced by inert gas condensation and examined with TEM, AFM, XRD, and SQUID. Ferromagnetism was found within the investigated temperature range of 10 to 400 K for all clusters including TiO. Interestingly, all clusters exhibit a magnetization enhancement after exposure in air for an extended time, which is probably due to the generation of oxygen vacancies and of Ti³⁺ or Ti²⁺, whose coupled spins may create the observed ferromagnetism². The relationship between cluster structure, size, defects and magnetism will be discussed. - This research is supported by NSF-MRSEC, ONR and NCMN. ¹J. M. D. Coey, *Curr. Opin. Solid State Mater. Sci.* **10**, 83 (2006) ²S. Yoon, *J. Phys.: Condens. Matter* **18**, L355 (2006)

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