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Magnetism of DMS SnO_2:Co Thin Films Grown by RF Sputtering[1] GRATIELA STOIAN, Florida State University, PATRICIA STAMPE, ROBIN KENNEDY, Florida A&M University, STEPHAN VON MOLNAR, Florida State University — SnO_2:Co thin films with dopant concentrations ranging from 2-15at% were deposited on r-cut sapphire substrates via RF sputtering, to examine the origin of the room temperature ferromagnetism (RTFM) observed in such materials. Films deposited with 9:1 Ar/O_2 partial pressure ratio have a saturation moment of $\sim 0.34 \mu_B$/Co. Utilizing Coey's generalized grain boundary model [1], this implies that only $\sim(2 \pm 0.5)$% of the sample is FM. Furthermore, XPS studies reveal that the cobalt valance is 2+, suggesting it exists in the form of an oxide, either Co substitutional or as CoO clusters. Furthermore, angle dependent measurements indicate no sign of phase segregation. We speculate that the FM is due to the spontaneous magnetization of uncompensated spins at the surface of the CoO antiferromagnetic nanocrystals [2] in the host SnO_2. This model may also explain the large anisotropy observed in some of our films.

[1] Coey et. al IEEE Trans. Magn. (2010)
[2] Dietl et. al PRB **76**, 155312 (2007)

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