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Investigations of a New Diluted Magnetic Oxide with Room Temperature Ferromagnetism in Co-doped HfO₂ Y.H. CHANG, W.C. LEE, M.L. HUANG, Dept. of Materials science and Engineering, National Tsing Hua Uni., Taiwan, S.F. LEE, Inst. of Physics, Academia Sinica, Taiwan, Y.L. SOO, Dept. of Physics, National Tsing Hua Uni., Taiwan, M. HONG, Dept. of Materials science and Engineering, National Tsing Hua Uni., Taiwan, J. KWO, Dept. of Physics, National Tsing Hua Uni., Taiwan — The structural, chemical, and magnetic properties of HfO₂ epitaxial films ~100nm thick grown on YSZ at varying growth temperature have been systematically investigated. Nearly cobalt cluster-free films with RT ferromagnetic behaviors can be obtained via low T growth. *In-situ* XPS analysis during growth indicated the formation of metallic cobalt at the initial growth stage under a low O₂ partial pressure ~10⁻¹⁰Torr, and that the metallic cobalt can be mostly eliminated by raising the pressure to 10⁻⁷ Torr. In conjunction with EXAFS local structural analysis and post annealing experiments, we infer that cobalt ions in low T grown films are located at interstitial site and appeared to be stable after being annealed in O₂ at 350°C. Further Hall measurements are now underway to measure the carrier concentration, and to elucidate their role to the apparent ferromagnetism.

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