Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Local Environment Surrounding Co in MBE-grown HfO_2:Co Thin Films Probed by EXAFS and XMCD[1] Y.L. SOO, S.C. WENG, W.H. SUN, S.L. CHANG, W.C. LEE, Y.S. CHANG, M. HONG, J. KWO, National Tsing Hua University, Z.S. YANG, H.-J. LIN, D.G. LIU, J.F. LEE, C.T. CHEN, NSRRC, Y.H. KAO, J.M. ABLETT, C-. C. KAO, NSLS — Local structures in MBE-grown HfO_2:Co films with different Co concentration has been investigated using the EXAFS technique. The average local environment surrounding Co exhibited by our EXAFS data consists of two major near shells attributed to O and Co neighboring atoms at distances of 2.04 Åand 2.49 Åfrom the central Co atom, respectively. As the Co concentration increases, the average coordination number of the Co shell systematically increases while that of the O shell decreases. Our experimental results indicate that while chemically bonded with O at a most-likely interstitial location, Co impurity atoms may also form Co clusters even at a relatively low concentration of $\sim$1%. The progressive formation of Co clusters is also consistent with our XMCD results that demonstrate increasing magnetic moment with increasing Co concentration.

[1]This research is supported by NSC in Taiwan and NSF in the US.

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Date submitted: 15 Dec 2005 Electronic form version 1.4