

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

(Zn,Co)O alloyed magnetic semiconductor: giant magnetization and experimental determination of band structure¹ GUOLEI LIU, Shandong University — Magnetic semiconductor exhibits both ferromagnetism and semiconductor properties. Since the magnetic dopants tend to aggregate in, the thermodynamical miscibility of transition metals in semiconductors is in fact extremely low (generally $\leq 15\%$, in diluted region). The miscibility of transition metals exceeding diluted region is challenge for material science and future spintronic applications. In this paper, we have been grown (Zn,Co)O thin films by oxygen plasma-assisted molecular beam epitaxy. The Co content in these films can be up to 45%, which we defined as alloyed magnetic semiconductor (AMS). The measurements of RHEED, XRD and in. situ. XPS indicated that (Zn, Co)O films are spinodal decomposition phase with ZnO wurtzite lattice. The saturated magnetization at room temperature was remarkably enhanced with increasing the Co content. It reach 530emu/cm³ at $x = 45\%$ which corresponds to the average magnetic moment $1.6\mu_B$ per Co. The electronic band structure of (Zn,Co)O films were determined by angle resolved photoemission.

¹the NSF Grant NO. 11374189 and 51231007

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Date submitted: 14 Nov 2013

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