

## PHOTOEMISSION SPECTROSCOPY STUDY OF DILUTED MAGNETIC SEMICONDUCTORS (Mn, Fe, Co IN II-VI SEMICONDUCTOR)

Kwang Hyun Cho, Hoon Koh, S.-J. Oh (Seoul National University), J.-H. Park (AT&T Bell Lab., U.S.A.), M. Han (Seoul City Univ.), Y.D. Kim (Kyung Hee Univ.), and J.S. Kim (Sook Myung Women's Univ.)

Diluted Magnetic Semiconductor(DMS) is interesting because it is at the interface of magnetism and semiconductor[1]. The property of magnetism and semiconductor can be varied as the doping concentration of magnetic ions which are mainly late 3d transition metal ions because of their large magnetic moments. Especially, the divalent magnetic ion ( $TM^{2+}$ ) is electrically neutral in II-VI semiconductor host as the cation substitution. To understand various phenomena of DMS, its electronic structure must be understood, and it is the main concern for Photoemission spectroscopy and its related experiments (Resonant Photoemission Spectroscopy (RPES), X-ray Absorption Spectroscopy and Bremsstrahlung Isochromatic Spectroscopy) reported here.

We found that the 3d electrons in transition metal ions are much hybridized with host electrons in semiconductor from the RPES near TM  $2p \rightarrow 3d$  threshold energy. Figure shows high resolution spectra near the valence band maximum at  $h\nu = 100$  eV. The spectra of DMS doped with about 5% of the Mn, Co and Fe in ZnSe host are rather different from that of the undoped pure ZnSe semiconductor. Also, we can see transition metal induced states in the fundamental band gap of host ZnSe semiconductor in Fe and Co doped system, whereas there is no gap states in Mn doped system. Hybridization strength between TM and host semiconductor states and TM ion multiplet structures are expected to be responsible for this difference[2].

1. J.K. Furdyna, J. Appl. Phys. **53**(11), 7639 (1982).
2. O. Gunnarsson and K. Schöhammer, Phys. Rev. B **28**, 4315 (1983).

