

HL 9 Hauptvortrag Ohno

Zeit: Freitag 14:15–15:00

Raum: TU P270

Hauptvortrag

HL 9.1 Fr 14:15 TU P270

Ferromagnetic III-V Semiconductors Spintronics — ●HIDEO OHNO — Research Institute of Electrical Communication, Tohoku University and ERATO, JST

Ferromagnetic III-V semiconductors offer a variety of new possibilities by combining semiconducting properties with magnetic cooperative phenomena [1]. Because of the hole-mediated ferromagnetism, one can turn on and off ferromagnetic phase isothermally and reversibly without changing temperature through electric field control of carrier concentration in a temperature range close to the transition temperature T_C [2]. At lower temperatures, one can electrically modify coercive fields at which magnetization reversal takes place [3]. We have thus shown that in a class of ferromagnetic materials, magnetic properties can be electrically controlled just like conductivity of semiconductors can be altered by electric field effect. We have also shown that electrical current driven domain wall motion in a lithographically defined area of ferromagnetic III-V semiconductor structures occurs at current density much lower than the metallic counterparts [4]. The results of current induced magnetization reversal in nanoscale magnetic tunnel junctions in these material systems will also be reported [5].

[1] H. Ohno, *Science*, 281, 951 (1998).

[2] H. Ohno et al., *Nature*, 408, 944 (2000).

[3] D. Chiba et al., *Science*, 301, 943 (2003).

[4] M. Yamanouchi et al., *Nature*, 428, 539 (2004).

[5] D. Chiba et al., to appear in *Phys. Rev. Lett.*