MBE를 이용한 $Si_{1-x}Mn_x$ 박막의 성장 및 자기적 특성

Growth and magnetic properties of $Si_{1-x}Mn_x$ thin films by MBE

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Magnetic semiconductor $Si_{1-x}Mn_x$ were co- deposited on Si(100) substrates by MBE at low substrate temperature of 200°C and varying alloy composition (x) The Si oxide was thermally desorbed at a temperature of 1100°C for 30 min and then cooled slowly with the maximum rate is 1°C per second to substrate temperature Growth rate was ~15Å/min and average film thickness was around 100nm Thickness and composition were measured by utilizing an alpha-step and energy dispersive X-ray spectroscopy, respectively Some of grown $Si_{1-x}Mn_x$ thin films were checked by X-ray photoelectron spectroscopy (XPS) X-ray analysis and TEM shows that the deposited $Si_{1-x}Mn_x$ semiconductor thin films are homogeneous phases. The electrical resistivities of $Si_{1-x}Mn_x$ semiconductor thin films are 6.0×10^{-4}~1.2×10^{-2}Ωcm at room temperature and decrease with increasing Mn concentration Carries type, mobility and carrier concentration were obtained by Hall Effect measurement The magnetic properties of the films were measured by superconducting quantum interference device (SQUID). Morphological properties of the deposited film have been investigated by Atomic force microscopy (AFM) The diameter and the height of islands which shown in AFM, increase with Mn concentration

Acknowledgement
This work was supported by the Research Center for Advanced Magnetic Materials (RECAMM, Chungnam National University, Korea) and the Brain Korea 21 Program (BK21, the Ministry of Education & Human Resource Development, Korea)