T-18

Epitaxial growth and magnetic properties of $FeSi_2$ thin films grown on GaAs(100)

Sungyoul Choi[1], Jiyoun Choi[1], Jeongyong Choi[1], Soon Cheol Hong[1], Sunglae Cho[1], Yongsup Park[2], and Hyun-Min Park[2]

[1]*Department of Physics, University of Ulsan, Mugeo-2dong, Nam-gu, Ulsan 680-749, South Korea.*
[2]*Materials Evaluation Center, Korea Research Institute of Standards and Science, Taejon 305-600, South Korea*

β-$FeSi_2$ is a nonmagnetic semiconductor material with a band gap of 0.83~0.87 eV. The crystal structure of β-$FeSi_2$ is base-centered orthorhombic having 48 atoms per unit cell and lattice parameters a=9.863 Å, b=7.884 Å, and c=7.791 Å [1-3]. We have made epitaxial $FeSi_2$ thin films on GaAs(100) substrate by using molecular beam epitaxy (MBE). The base pressure of the chamber was 5.0×10^{-9} Torr. The growth rate and substrate temperature were 0.27 Å/s and T_S=470 ℃, respectively. Figure 1 shows a streaky RHEED pattern and X-ray diffraction pattern of $FeSi_2$ thin film grown on GaAs(100) substrate, indicating the layer-by-layer growth and c-axis orientation of $FeSi_2$ thin films on GaAs(100). In this talk we will present the growth temperature dependent and thickness dependent properties of β-$FeSi_2$ thin films.

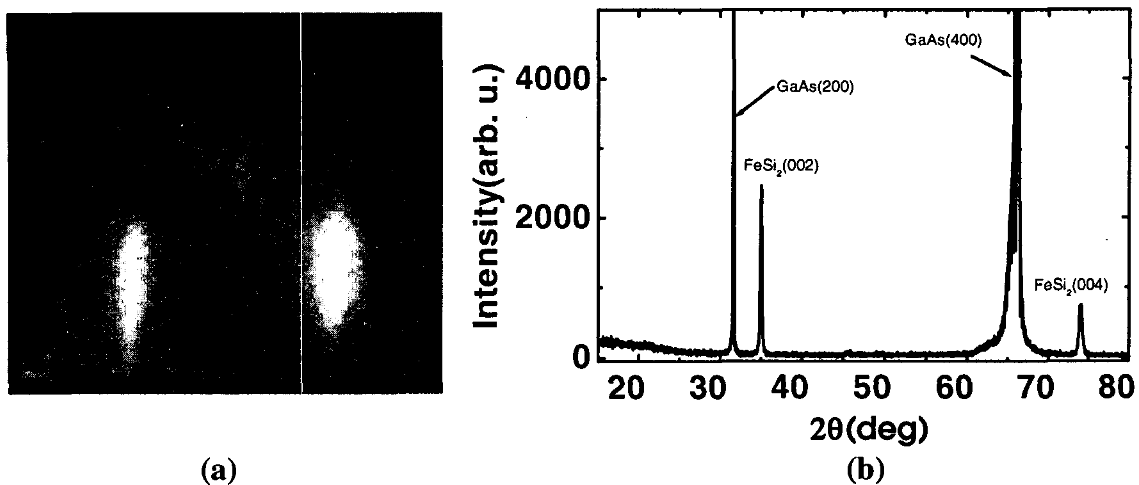

Figure 1. (a) RHEED pattern of $FeSi_2$ thin film on GaAs(100) at T_S= 470 ℃. (b) X-ray diffraction of $FeSi_2$ thin film on GaAs(100).

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