STRUCTURAL PROPERTIES OF HIGH-TEMPERATURE-GROWN GaMnSb / GaSb

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GaMnSb is considered as one of the materials useful for spintronics. Especially much interest received the ferromagnetic ordering related to the MnSb inclusions produced during high-temperature growth of GaMnSb films [1, 2]. The aim of this work is to determine structural properties of this material, in dependence on different content of manganese.

To achieve the creation of ferromagnetic precipitates, investigated $Ga_{1-x}Mn_xSb$ layers were grown on GaSb(100) substrate, using the MBE technology. Epitaxial growth was performed at high temperature equal to 720 K. The thickness of $Ga_{1-x}Mn_xSb$ layers was equal to 0.63 μm. Three types of samples were investigated: GaMnSb-1, GaMnSb-3 and GaMnSb-7, with different Mn concentration (1%, 3% and 7% respectively).

Strain state and lattice parameter of $Ga_{1-x}Mn_xSb$ layers were studied using high-resolution diffractometer in double- and triple-axis configuration. Reciprocal space maps (RCMs) for symmetrical 004 and asymmetrical 224 reflection, as well as the rocking curves and $2\theta/\omega$ diffraction patterns were registered. Polycrystalline phase was investigated using monochromatic synchrotron X-ray beam at W1 station in HASYLAB-DESY at Hamburg, applying the glancing incidence diffraction method (2θ scan). To examine the depth profiles of Ga, Sb and Mn elements, secondary ion mass spectrometry (SIMS) measurements were performed. Also scanning electron microscopy (SEM) was used for probing the sample surface.

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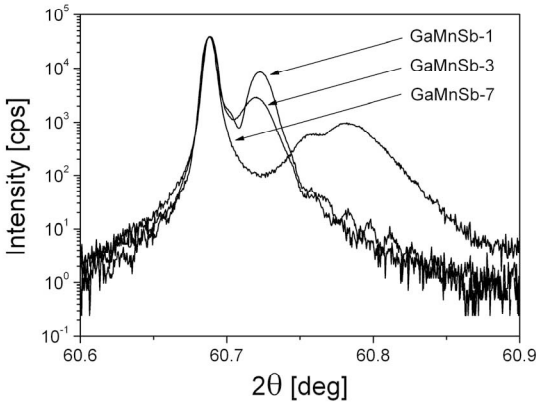

Figure 1. $2\theta/\omega$ diffraction pattern of GaMnSb samples.

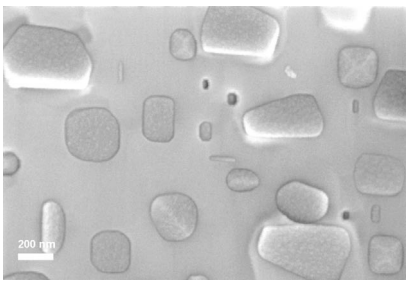

Figure 2. SEM image of GaMnSb-3 sample surface.

References

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