useful not only to obtain information on the strain around a defect from the interference fringes in Fig. 2(a) but also to obtain the structural information of the defect from the image contrast caused by Borrmann effect in Fig. 2(b).

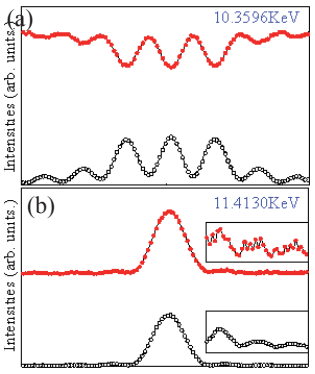

Fig.1 Measured GaAs 200 rocking curves in Laue case at two X-ray energies. Crystal thickness is 45μm.

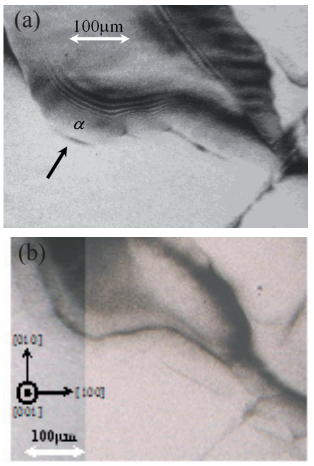

Fig.2 Topographs (a) and (b) recorded at two energies in Fig.1(a) and (b), respectively. Topograph in (b) was composed of two topographs.

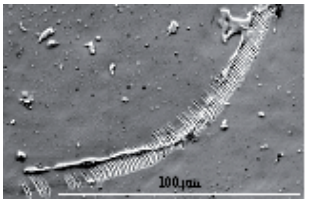

Fig.3 SEM image of the same region as in Fig. 2. Diches are observed along α .

[1] R. Negishi et al, T. Fukamachi, M. Yoshizawa, Kj. Hirano, Ki. Hirano, T. Kawamura, *J. Phys. Soc. Jpn.,* **2008**, *77*, 023709-1-3. [2] R. Negishi, T. Fukamachi, M. Yoshizawa, Ken. Hirano, Kei. Hirano, T. Kawamura, *Phys. Status Solidi A*, **2009**, *206*, 1865-1869.

Keywords: crystal structure factor, phase difference, GaAs

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Conceptual design of the coherent X-ray scattering beamline at the taiwan photon source

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The coherent X-ray scattering beamline is one of the first phase beamlines designed for the Taiwan Photon Source, a new 3 GeV ring under construction at the National Synchrotron Radiation Research Center in Taiwan. With an in-vacuum undulator, this beamline will provide highly coherent beam mainly for X-ray photon correlation spectroscopy as well as small angle X-ray scattering experiments. The beamline is designed to operate in the energy range 5-20 keV, suitable for most conventional SAXS, including anomalous measurements. A vertical focusing mirror collimates the beam to preserve the coherent photons with compatible coherent lengths in vertical and horizontal directions. The horizontal coherence is nevertheless filtered by pairs of well polished slits for coherent experiments. An additional horizontal mirror focuses the incoherent beam horizontally for conventional SAXS experiments. The beamline can provide in either high flux mode or high energy resolution mode by changing monochromator's diffractive objects from silicon crystals to multilayers.

Keywords: beamline optical design, coherent scattering, small-angle x-ray scattering

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Real-structure anisotropy in GaMnAs layers

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The three-dimensional diffuse scattering pattern of a thick GaMnAs layer (layer thickness of 500 nm, Mn concentration of 7%) was measured in order to study the short range ordering of atoms in the layer. The layer was grown on a standard 2-inch GaAs wafer in our institute by means of the low-temperature molecular beam epitaxy. The experiment was carried on the diffraction beamline at the ELETTRA synchrotron radiation facility. The photon energy of 10 keV, i.e. slightly below the K absorption edge of Ga, was selected in order to avoid the fluorescence from the sample. The sample was mounted on the Kappa goniometer, a two-axis tilt stage was used in order to align the normal to the sample surface parallel to the phi-axis of the goniometer. This makes possible to scan a large volume of the reciprocal space by rotation the sample around its surface normal without changing the angle of incidence. The measurement was carried out in grazing incidence in order to hinder the penetration of the incident X-ray photons into the bulk - the beam was incident on the sample at a grazing angle of 0.3º. The scattered intensity in a large three-dimensional region of the reciprocal space of the GaMnAs layer was measured by recording a set of two-dimensional frames on a large CCD detector at different phi angles.

A three-dimensional map of intensities in the reciprocal space constructed from the set of two-dimensional CCD frames revealed thin one-dimensional features in the directions [111] and [-1-11]. Evidently, these features indicate the presence of stacking faults in crystallographic planes (111) and (-1-11). On the other hand, there were observed no stacking faults in the planes (-111) and (1-11). Structural models with intrinsic, extrinsic and twin stacking faults were created, including the combinations of individual types of stacking faults. The calculated X-ray scattering patterns from the model structures were compared to the experimental data. The same experiment was repeated using a thin GaMnAs layer (thickness 35 nm) and for the same samples after the annealing at the temperature of 200ºC for the period of 10 hours. No appreciable difference in the scattering patterns of GaMnAs layers was observed. The relation of this structural anisotropy to the observed magnetic anisotropy is the subject of our further studies.

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Keywords: X-ray diffuse scattering, magnetic semiconductors

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Coherent bragg imaging of strained semi-conductor nano-