# 13-Defects, Microstructures and Textures

is measured in the θ–2θ geometry on asymmetric planes. On the contrary the open window detector geometry, though affected by a higher diffuse scattering, is not affected by the lattice tilting.

For large values of the splitting angles $\Delta\theta$, exact formulae are derived for the calculations of the components of the strain.

As an application of the method accurate measurements in fully strained and partially relaxed AlAs/GaAs and InGaAs/GaAs heterostructures are presented. From these measurements the AlAs lattice parameter and Poisson ratio are obtained.
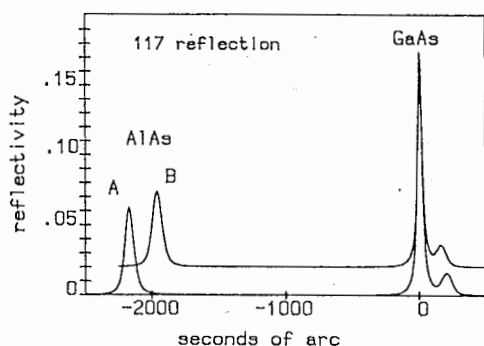
CuKα 117 diffraction profiles of a GaAs/AlAs/GaAs heterostructure. The small peak on the right side of the GaAs substrate peak comes from the strained GaAs 1 μm thick cap layer.

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CHARACTERIZATION OF SI-TASI$_2$ *IN SITU* COMPOSITES BY SYNCHROTRON WHITE BEAM TOPOGRAPHY. By S.R. Stock(1), Z.U.Rek(2)*, B.M. Ditchek(3), 1) School of Materials Engineering, Georgia Institute of Technology, Atlanta, GA 30332, 2) Stanford Synchrotron Radiation Laboratory, Stanford, CA 94309, USA, 3) GTE Laboratories, Waltham, MA 02254.

Directional solidification of semiconductor-metal eutectic mixtures commonly yields aligned arrays of metallic rods in a single crystal semiconductor matrix. Si-TaSi$_2$ composites are the most promising for device applications such as diodes. Topographic and rocking curve data indicate that these crystals might also be useful as a optical element for synchrotron x-ray beams. The characterization of the (111) oriented wafers was performed using transmission Laue topography, section topography and a double crystal rocking curve. Transmission Laue topography reveals sharp defined topographs of Si wafer and diffuse radial streaks that reflect the symmetry of the Si matrix. The diffuse streaks are characterized by using absorption edges of various filters placed in the incident beam. This study indicates that streaks are due to the diffraction from TaSi$_2$ rods and that the rods have a very strong preferred orientation relative to the Si matrix. Double crystal rocking curves of (111) and (333) reflections are a factor of 20 wider than those of perfect Si crystals. The application of white beam synchrotron radiation and absorption edges of filters to study the texture of the very small volume fraction of the phase of interest will be discussed.

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PS-13.03.01 STUDY ON DEFECT AND STRUCTURE IN A NONLINEAR CRYSTAL OF LITHIUM BORIC OXIDE (LBO). BY Q. L. Zhao*, Y. S. Huang and D. Y. Tang, Fujian Institute of Research on the Structure of Matter, Academia Sinica, China.

The crystal of LBO is a new nonlinear optical material with good SHG (C. Chen, 1987, Intern. Laser Conf., Xiamen, China). It crystallizes in the orthorhombic system (S. Q. Zhao, et al, J. Synth. Crys., 1989, 18, 9—17). The chief defects observed by X-ray topography are the grown-in dislocation, inclusions and the inclusion-induced dislocation. All dislocations run in straight and take the Burgers vectors nearly 80% to be $b=<100>, <101>$ and $<001>$. The dislocation formation depends closely on the loosed packing of the B—O ring and Li, and on the high movability of a pair of Li atoms in the structural channel along the c-axis from the structural viewpoint (Q. L. Zhao, et al, Acta Phys. Sin., 1992, 41, 272—275). The grown-in dislocations emerged simultaneously on the entrance and exit surfaces on X-ray projection topographs shows a similarity with the stacking fault appearing equal thickness fringes (A. Authier, Phys. Sol. Stat., 1968, 27, 77—93), a set of the interference fringes along a dislocation appear with the number equal to the Pendellösung fringes at the specimen edges. Inclusions are formed via absorbing gas in sphere, trapping flux in the orthorhombic shape believed to be due to the negative crystal growth, and adhering the crystalite in random orientations. With similarity to BBO (Q. L. Zhao, et al, J. Synth. Crys., 1992, 21, 156—160), the inclusion severely induces the dislocation occured either in a dislocation network parallel to the plane of (010) or in the strained layer normal to the b-axis through the same mechanism as the grown-in dislocation. The result indicates that only overcoming the inclusion formation in the growth process will much greatly increase the crystal perfection. Finaly, two experimental evidences, one on measuring the lattice constants shows that the lattice expansion takes place in the a- and b-axis and the contraction only in the c-axis when raising the temperature from 170° to 790℃ and the other on testing the microscopic hardness of (100), (010) and (001) faces shows the smallest hardness only on the (001), strongly prove that such a pair of Lithium atoms in the structure behave high movability along the c-axis possibly due to the largest interatomic spacing between Li if compared with that in other structures. The following growth phenomenon, say the crystalite is used to be adhered seriously on (100), only a few on (010) and never on (001), also provides the supplemental evidence to illustrate the fact that the higher the free bonding density on the face, the greater the possibility on absorbing the crystalite.