11. REAL AND IDEAL CRYSTALS

11.1-6 XRD-OBSERVATION OF SILICON SINGLE CRYSTALS IRRADIATED WITH ENERGETIC HEAVY IONS. By H. Tomimitsu, Department of Physics, Japan Atomic Energy Research Institute, Japan.

Lattice imperfections in Si single crystals irradiated with different kinds of energetic ions under several specified conditions with the dose of 10^15-10^16 cm^-2, have been examined by conventional X-ray diffraction topography (XDT)-Lang's method. The present article summarizes the results of the XDT-observation on heavy-ion-irradiated Si wafers, in addition to the preliminary results in the case of 150MeV Ni^7- and C^12- irradiation (H. Tomimitsu, Jpn. J. Appl. Phys., 1983, 22, L674-L676).

1. Two different types of irradiation effects have been revealed: The very faint, black-and-white contrasts, indicating the concentration of the lattice strains, were observed at the boundaries of the irradiated- and non-irradiated regions, in the case of 150MeV Ni^7-, 70MeV Br^7-, 150MeV Si^8+, 150MeV S^8+, 150MeV C^12+, and C^12-; 150MeV Ni^7-, 90MeV Br^7-, and 140MeV Au^19+.

2. The systematic fringes could not be observed in the case of homogeneous irradiation, but were realized by beam-scanning with application of an alternating electric or magnetic field. Thus, the origin of the systematic fringes can be attributed to the inhomogeneity of the ion beam (O. Bonne, M. Hart and G.H. Schwartzke, Phys. Stat. Solidi, 1969, 22, 361-374). Furthermore, the occurrence of systematic fringes seems to be affected by the ion-energy, because the fringes were not observed in the case of 150MeV F^8+, ions, while they were clearly seen in the case of 60MeV F^- ions.

11.1-7 LATTICE DEFORMATION OF PROTON IMPLANTED BOUNDARY IN SILICON. By B. Slepetukh, P. Kamnowicz and K. Wieteska, Department of Solid State Physics, Institute of Atomic Energy, 05-400 Swierk, Poland.

Two regions of a silicon crystal were implanted by an inhomogeneous beam of protons with energy 1.0 MeV and 1.6 MeV, respectively. The average dose was 1.1x10^17 cm^-2. Reflection topographs were taken for various diffraction vectors using a double crystal X-ray spectrometer. Sets of fringes due to the interferences between the beams diffracted by the implanted and non-implanted volumes were observed on the implanted areas. Because of the lattice parameter increase in the implanted layer, there are stresses at the boundary between the implanted and non-implanted zones. In our case, the X-ray contrast of this boundary had a complicated structure. Series of topographs taken at different points on the rocking curve in the /130/-setting for CuKα radiation were taken. The contrast under observation depended on the angular position on the rocking curve as well as on the rocking curve as well as on the sign of the η_4, product, where η_4 = nυ / L with the lattice tilt, respectively. In order to apply a step-like model similar to that proposed by Alter et al., (Czech. J. Phys. B33, 158, (1983)), the lattice parameter change in the implanted parts of the crystal were measured. The rocking curves were taken by simultaneous diffraction from both implanted layers and a perfect part of the crystal.

11.1-8 INVESTIGATION OF HELIMAGNETIC DOMAINS IN ZnCr2Se4 USING NEUTRON Topography. By J.A. Cooper (1), J. Baruchel (2). M. Schlenker (3), and S.B. Palmer (1).

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Neutron diffraction topography is a very direct method for imaging inhomogeneities in the magnetic structure of single crystals, i.e., magnetic domains of all kinds as well as coexistence of phases with different magnetic orders. Therefore the neutron diffraction topography is always useful in such cases.

The peculiarities of neutron diffraction topography are the following:

1. Neutron diffraction topography is a very direct method for imaging inhomogeneities in the magnetic structure of single crystals, i.e., magnetic domains of all kinds as well as coexistence of phases with different magnetic orders. Therefore the neutron diffraction topography is always useful in such cases. It is often the only method available for their observation: this is the case for chirality domains, distinguished by the left- and right-handedness of the helical magnetic structure in the case of ZnCr2Se4.

2. Neutron diffraction topography is a very direct method for imaging inhomogeneities in the magnetic structure of single crystals, i.e., magnetic domains of all kinds as well as coexistence of phases with different magnetic orders. Therefore the neutron diffraction topography is always useful in such cases.