(1) M. Gailhanou, T.Baumbach, U.Marti, P.Silva, F.K. Reinhart, M.Ilegems; Appl.Phys.Lett. (1993) in press

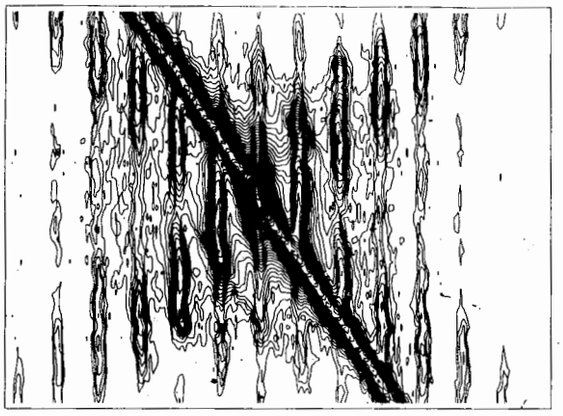

Fig.1 Contour plot of the reciprocal space mapping of a GaAs surface grating in the vicinity of (004) GaAs

PS-13.03.09 SKELETON STRUCTURES IN POROUS SILICON. I.L. Torriani*, O. Teschke, M.U. Kleinke, Instituto de Fisica, and M.C. Goncalves, Instituto de Quimica, UNICAMP, Campinas, S.P., Brazil.

The micro structure of luminescent and non-luminescent porous silicon formed by electrochemical etching has been characterized by X-ray and electron diffraction. Experimental and theoretical research has been recently focused on light emission properties of porous silicon. The mechanism resulting in the visible luminescence at room temperature is still a controversial question but it seems to be related to the structural features of the porous layer. The structure of porous silicon has been studied previously (Barla et al.,J.Cryst. Growth, 1984, **68**, 727).and several authors confirm the single-crystalline nature of the layers. Diffuse scattering around Bragg reflections has also been analyzed recently to obtain information on the pore structure of the films (Bensaid et al., Solid State Comm., 1992, **79**, 923). This communication deals with the comparison of X-ray and electron diffraction patterns of etched silicon wafers with two different crystallographic orientations. Transmission electron microscopy and double crystal diffractometry were used to characterize the samples. Photoluminescence measurements were performed to correlate the results with the structural features of the layers. Results of this study reveal several differences in the crystallinity of the skeleton structure for luminescent and non-luminescent samples.

Sponsors: CNPq, FAEP, FAPESP

PS-13.03.10 TEXTURE EFFECT IN ANALYSIS OF RETAINED AUSTENITE IN STEEL. By Matti Järvinen, Lappeenranta University of Technology, P.O.Box 20, SF-53851, Lappeenranta, Finland

X-ray diffraction is a standard tool for determining austenite concentration in polycrystalline steel. If the grains of austenite and ferrite are randomly orientated in the sample, the work can be done rapidly and accurately. To resolve the problem it is sufficient to measure carefully the integrated intensity of only one reflection from each phase.

However, very often the metallurgical samples have preferred orientation or texture, especially if the material is made by mechanical working or if there has been recrystallization by heat treatment or due to welding. The texture distorts the true intensity ratios in the experimental data and gives an erroneous value to the austenite content. In these cases more reflections are usually measured and the final outcome is calculated as an average of different pair values.

For improving this calculation procedure I have developed a method that takes the special features of texture effect into account (Järvinen,M. 1985. Lecture notes 2/85. Lappeenranta Univ. of Technology, Finland.). The method is based on symmetrized harmonics expansion for the representation of the orientation distribution of the crystallites in the sample. The method presumes the use of specimen spinner in data collection.

In retained austenite analysis the orientation distribution of each phases is represented separately by cubic harmonics expansion. This introduces adjustable parameters into the formula of theoretical intensities. The parameters of the model, including consentration parameters of ferrite and austenite phases, are determined by fitting theoretical integrated intensities with the experimental data.

For demonstrating the use of the method, integrated intensities of six reflections (*200, 220, 311* for austenite and *200, 211, 220* for ferrite) from several samples were measured using $CuK\alpha$ radiation. It was found that this information was sufficient for determing the parameters, but the result was much more accurate when more reflections was measured.

PS-13.03.11 TEXTURE STUDY OF $YBa_2Cu_3O_{7-\delta}$ THIN FILMS USING X-RAY DIFFRACTION. By D. Chateigner, P. Germi and M. Pernet*, Laboratoire de Cristallographie CNRS, BP 166, 38042 Grenoble Cedex 09 France.

Recently there has been growing interest in texture analysis of high temperature superconductors because preferred orientation is closely linked to electrical properties. The superconducting currents are stongly anisotropic and flow in the CuO_2 planes, so the orientation of the ab-planes of individual domains markedly influences the properties of thin films. In the case of $YBa_2Cu_3O_{7-\delta}$ (YBCO) thin films on single-crystal substrates, textures are extremely strong and routine procedures developped for texture analysis of metals are generally inappropriate. This has led us to develop special procedures (Chateigner et al., J. Appl. Cryst., 1992, 25, 766-769).

YBCO films grown on MgO substrates are generally found to consist of domains oriented with either the a-axis or c-axis perpendicular to the substrate surface. The in-plane texture were carefully studied by X-ray pole figure measurements. That texture is revealed by the complex (103/013) pole due to the (110) twinning in the samples. The pole figure data were analysed from χ and ϕ scans (χ and ϕ being the classical angles in the four-circle diffractometer geometry). It was found that there were two in-plane epitaxial state in which the YBCO a-axis (or b-axis) was parallel to either [100] direction or [110] direction of the substrate. For the description of texture components the general formulation : $c_{\perp}\alpha$ is used when the c-axis direction of the film is aligned with the substrate normal, α being the angle between the in-plane a or b direction of the film and the [100] of the substrate.

