surfaces. Its value of (4.0 ± 0.1)GPa was found for the (001) oriented specimens. The glide systems of the investigated crystals basing on the {100} planes and <110> directions were detected by the microhardness anisotropy observations. The dislocation densities were estimated at the level lower than $10^4 cm^{-2}$ by the etch pits technique and the X-ray method. For the investigated crystals the X-ray $L_{\alpha 1}$, $L_{\beta 1}$, $L_{\beta 2}$ and $L_{\beta 4}$ emission spectra of Ba^{+2} and La^{+3} (A.A.Dakhel, Jpn.J.Appl.Phys.,(1982),21,1521) were obtained. They were compared with the same lines for BaF_2 and LaF_3 crystals. These investigations were carried out using the lithium fluoride (200) analysing crystal. The positions and the half-widths of these lines were defined. For example, it was confirmed that the half-width of the $L_{\beta 4}$ line increases from (11.3±0.5)eV for lanthanium fluoride up to (16.0 ± 0.5)eV for lanthanum ions in the $BaLaGa_3O_7$ single crystals. The information about some optical properties of the $BaLaGa_3O_7$ crystals was reported in (W.Wardzynski et all.,Physica B+C, (1984),123B,2).
Autors of the present work belive that their investigations permitted to select the best conditions for the $BaLaGa_3O_7$ single crystals growth process, and, on the other hand, to reveal the real structure of the crystals

07.9–2 OXIDATION BEHAVIOUR OF MAGNETITE, INVESTIGATED BY MEANS OF X-RAY ANALYSIS.

By M. Alavi, Chemistry Dept., Univ. Isfahan

Quantitative X-ray analysis, using soft radiation, results in information about the species and amount of oxidation products of so-called active magnetite.
For the formation of Fe_3O_4 the starting material α-Fe_2O_3 is applicated, which is to be reduced at 460-550°C by H_2/N_2. The active magnetite formed will be converted into maghemite, γ-Fe_2O_3 either directly after formation or after keeping a certain time at room temperature.
Contrary to the aged Fe_3O_4 which forms γ-Fe_2O_3 besides α-Fe_2O_3, the active Fe_3O_4 oxidizes to α-Fe_2O_3 completely. While cooling in an oxidizing atmosphere, the magnetite primarily formed shows an anomaly in Fe_3O_4 decrease between 290 and 350°C. An explanation is given by Faraday's passivation theory: temporarily an oxide skin is formed around the Fe_3O_4 grain which is hindering a further bulk oxidation.

07.9–3 Calculation of Single-Crystal Electrostrictive Coefficients from Time-Resolved X-Ray Diffraction Measurements

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The electrostrictive coefficients Q_{11}, Q_{12} and Q_{44} of high permittivity ceramics ($Pb(Zr,Ti)O_3$, $BaTiO_3$) can be measured separately with a time-resolved x-ray diffraction technique (Göbel, Adv. in X-Ray Anal., Vol 24, 1981; Zorn, to be published in Ferroelectrics). Electrostrictive lattice distortions are induced by an electrical ac-field and are measured as a function of polarization with x-ray diffraction. In a polycrystalline ceramic the electrostrictive distortions of crystallites are hindered by their neighbouring crystallites. This is obvious above all at high fields, where observed shifts in diffraction peaks are overlayed by asymmetric line broadenings. The broadenings must be taken into account for calculation of close-to-single-crystal electrostrictive coefficients. This is done with a least squares fit program. The program convolutes the diffraction peak at field zero with a predicted lattice constant distribution at high fields. By adapting the lattice constant distribution, the convoluted profile is fitted to the measured profile. Extrapolation leads to the lattice constants of stress free crystallites in the stressed ceramic.
In dilatometric measurements unreleased stresses lead to low electrostrictive coefficients. Time-resolved x-ray diffraction shows these stresses and therefore allows a correction of the result. It is a method to measure electrostrictive coefficients, which are close to single-crystal values, on materials that cannot be obtained as single-crystals.

07.9–4 THE MICROSTRUCTURE OF UNIDIRECTIONALLY SOLIDIFIED Ni-W EUTECTIC COMPOSITE. By S.F. Dirnfeld and D. Shectman, Dept. of Materials Engineering, Technion, Israel Institute of Technology, Haifa, Israel.

The microstructure of unidirectionally solidified (UDS) specimens of a Ni-W eutectic composition consists of W-fibres in a Ni(W) solid solution matrix which contains semi-coherent Ni_4W precipitates of the D_{1a} type. The growth axis of the W fibres and the orientation relationship between the phases in the as grown condition as well as after creep experiments at elevated temperatures were studied by transmission electron microscopy. Selected area diffraction patterns indicate that the growth axis (checked on three different fibres) is that of the <111> family. The analysis of the diffraction patterns taken from the boundary region of the Ni(W) and W phases shows that the orientation relationship between the phases is of the Bain type, so that <100> of the W fibres in parallel to the <100> of the Ni(W) matrix. It was found that the matrix of the as-grown specimens solidified at relatively high solidification rate (R>0.9 cm/hr) contains equiaxial Ni_4W precipitates of D_{1a}-type (face centered tetragonal structure) with the same orientation relationship as in Ni_4Mo (Okomoto and Thomas, Acta Met. (1971), 19, 825). The Ni_4W precipitates in specimens solidified at lower R are plate-like in shape with identical orientation relationship as mentioned before. The boundary between the two phases Ni_4W and Ni(W) solid solution consists of dislocation networks to compensate for the incoherency between the two structures. The fault structure of the W fibres shows low density of dislocation and no subboundaries were detected. A specimen that was subjected to creep for 95 hours at 960°C, shows strained areas. The boundary between the W fibres and the matrix is highly stressed at elevated temperature due to the difference in the thermal expansion coefficients and the different ductility of the two phases,