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 $L_{\alpha 1}, L_{\gamma 1}, L_{\gamma 2}$ and $L_{\gamma 4}$ 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 $L_{\gamma 4}$ 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

07.9–3 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.

07.9–2 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.

07.9–4 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 $D1_a$ 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 $D1_a$-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, therefore the boundary serves as a source for dislocations and microtwins. Planar faults, identified as microtwins are observed to emerge from the boundary area between the tungsten fibres and the matrix penetrating through the Ni_4W phase. The diffraction pattern analysis identified them as having the $(111)_{Ni}$ habit plane. No systematic dislocation substructures have been observed in the matrix because of the high temperature at which the creep specimen was left after failure had occurred.

07.9–6 IMPERFECTIONS IN THE SINGLE CRYSTALS OF $Cd_{1-x}Mn_xTe$. By J.Przedmojski,*A.Mycielski, *T.Piotrowski,B.Pałosz and B.Pura.
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During the past several years physical properties of these crystals reffered also as "semimagnetic-semiconductors" have been extensively studied, although their structure up to now has not been identified especially for $x \geqslant 0.4$. For $x > 0.4$ multiple twinning or presence of hexagonal crystallities with $c/a = \sqrt{6}$ were observed (A.Y.Wu,R.J.Sladek,J.Appl. Phys.(1982)53, 8589). Our measurements concerning X-ray investigations on crystals with $x = 0.4$. Crystals were obtained by modified Bridgeman method. Laue method, retigraph and powder technique as well as X-ray high temperature investigations were applied. From these investigations the zinc-blende structure with random stacking faults (twinning) were established.

07.9–5 INVESTIGATION BY X-RAY DIFFRACTION METHODS OF THE WORKING LIFE OF DIMENSIONALLY STABLE ANODES (DSA) FOR INDUSTRIAL ELECTROCHEMISTRY. By Chr. Modès, W.C. Heraeus GmbH, Hanau, Fed. Rep. of Germany

There are usually three mechanisms which cause passivation of activated electrodes during technical electrolysis:

1.) The electrocatalyst in the anode coating of the DSA has been used up after the normal operating life of the electrode (e.g. by oxidation to volatile or soluble oxides) → normal wear.

2.) The electrode coating has peeled off from the electrode substrate.

3.) The electrode coating has been poisoned by unfavorable additives or by decontaminations in the electrolyte.

The above mentioned mechanisms have been studied on electrodes obtained from Heraeus Elektroden GmbH using different diffraction methods on the automated Stoe diffractometer, e.g. Bragg Brentano and the transmission geometries.
Results will be presented which have been obtained with both conventional scintillation counters and a curved position sensitive proportional counter.

07.9–7 INVESTIGATION OF THE NUCLEATION KINETICS OF A LI_2O-AL_2O_3-SIO_2-BASED GLASS CERAMIC. By U. Schiffner and W. Pannhorst, Schott Glaswerke, Mainz, Germany.

The nucleation kinetics of a Li_2O-Al_2O_3-SiO_2 glass ceramic have been investigated by the so-called development technique. Due to the very high stationary nucleation rates, which have been estimated to be about 10^9 nuclei/(mm^3sec) within the main part of the nucleation region, the investigations are mainly concerned with the transient nucleation. The investigations were performed with rods of about 5 mm thickness which have been drawn from the melt. Isothermal heat treatments in the nucleation region were performed with specimens of 0,5 mm thickness and after developing the nuclei to an observable crystal size the number of crystals were counted.

In the interval from 710 to 785 °C induction periods, i.e. time intervals within which no stable nuclei are formed, from about 6 min. down to about 15 sec. were observed. At higher temperatures the nucleation rates are so low that in effect also some time elapses before stable nuclei are formed. From the data a TTT-diagram is constructed.

The temperature usually chosen for the development of the nuclei was 1000 °C. Variation of the development temperature in the range from 920 to 1070 °C shows a strong linear dependence of the number of observable crystals with temperature.

The dependence of the TTT-curve on the heat treatment history of the specimens is shown in a series of experiments. Drawing the rods and quenching from 980 °C gives the same TTT-curve while quenching from 920 °C and 850 °C shifts the TTT-curve to lower times.