07. MATERIALS SCIENCE

07.9-10 RENTGENOGRAPHIC INVESTIGATIONS INTO THE TRANSFORMATION KINETICS IN Li2O-Al2O3-SiO2 GLASS-CERAMICS. By G. Pannhorst, E. Rodek, U. Schillner, Schott Glaswerke, Mainz, Germany und H. Gehbel, P. Chayka, Siemens Research Laboratories, München, W. Germany. During the production of Li2O-Al2O3-SiO2 glass-ceramics two structural transformations occur: 1) Primary crystallization of the glass to a high-quartz solid solution containing glass-ceramic and 2) a subsequent phase transformation of the high-quartz s.s. crystal phase to a keatite s.s. crystal phase. In the present study these transformations have been investigated in situ with the high temperature X-ray powder diffractometer. The diffractometer is equipped with a position sensitive detector which enables to take "snapshots" of the transformation every few seconds when necessary. For both transformations relative integrated peak intensities were measured in isothermal runs to determine the extent of the phase transformation at each time interval.

The kinetics of the glass to h-quartz s.s. transformation were investigated in the range from 750 to 900 °C. For glass samples quenched at 730 °C the h-quartz s.s. phase is first observed between 750 – 775 °C. The time for apparent saturation ranges between approximately 15 min. at 750 °C to over 180 min. at 775 °C. The reaction rates are compared to those obtained for quenched samples analyzed at room temperature using XRD.

The transformation of the h-quartz s.s. phase to keatite s.s. phase was studied between 900 and 1000 °C. The time required for apparent saturation of the keatite s.s. phase ranges from about 10 min. at 1000 °C to over 150 min. at 900 °C. The results are compared with those obtained by Pannhorst and Michehau (Glastechn. – Ber. 56 K, 1983, Bd. 2, 572) who have monitored the extent of transformation by thermal expansion measurement performed on quenched samples.

07.9-11 HIGH TEMPERATURE X-RAY DIFFRACTION STUDIES OF THE TRANSFORMATION KINETICS IN Li2O-Al2O3-SiO2 GLASS-CERAMICS. By W. Pannhorst, E. Rodek, U. Schillner, Schott Glaswerke, Mainz, W. Germany, and H. Gehbel, P. Chayka, Siemens Research Laboratories, München, W. Germany. During the production of Li2O-Al2O3-SiO2 glass-ceramics two structural transformations occur: 1) Primary crystallization of the glass to a high-quartz solid solution containing glass-ceramic and 2) a subsequent phase transformation of the high-quartz s.s. crystal phase to a keatite s.s. crystal phase. In the present study these transformations have been investigated in situ with a high temperature X-ray powder diffractometer. The diffractometer is equipped with a position sensitive detector which enables to take "snapshots" of the transformation every few seconds when necessary. For both transformations relative integrated peak intensities were measured in isothermal runs to determine the extent of the phase transformation at each time interval.

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07.9-12 ON THE CONTROL OF STOICHIOMETRY IN SnO2 BY MEANS OF ANIONIC REFLECTIONS. By Yu. A. Rosenberg, L.I. Lunev, L.I. Kleischikinsky, V.M. Kiselev, L.G. Andrievskaya, Inst. of Transp. Engineers, 664074 Irkutsk and N.V. Shokhirev, Inst. of Chem. Kinetics, Siberian Branch of Academy of Sciences, 630090 Novosibirsk, USSR. The integrated reflecting powers of 111 and 210 Bragg reflections of SnO2 pellets have been measured on a double-crystal spectrometer with CuKα radiation. These reflections are anionic since cations do not contribute to their structure factor. The extinction length of these reflections is much larger than that of the photoelectric absorption and therefore absorption intensity obeys the kinematical theory formula. The current anion coordinate in the unit cell has been determined in each sample from the reflection intensity ratio of 210 and 111. The obtained values for different crystals fall within the interval 0.290 – 0.396. The number of anionic vacancies in the studied sample was determined from its structure factor 111 by comparing it to the corresponding standard value with a maximal intensity of this reflection. The results show that the composition of the studied samples changes from SnO2 – standard to SnO2 – 1.78. The electroconductivity measurements say that with a growing deviation from the stoichiometry the resistance in the samples falls (for extreme samples by 6 orders), which is to say that vacancy mechanism of the electroconductivity in SnO2 is substantial.