

second component ( $\text{BiNbO}_4$  or  $\text{SbSbO}_4$ ) belonging to the same structural type of stibiotantalate. Both fine powder and ceramic samples in the systems  $(1-x)\text{SbNbO}_4 - x\text{BiNbO}_4$  and  $(1-x)\text{SbNbO}_4 - x\text{SbSbO}_4$  were studied. We have shown that in the first system there is only one ferroelectric phase which exists in the region of concentrations  $0 \leq x \leq 0.2$ . The Curie temperature ( $T_C$ ) of this phase diminishes gradually from 680 K at  $x=0$  to 550 K at  $x=0.2$ . The phase above  $T_C$  is centrosymmetric, as well as the phase based on  $\text{BiNbO}_4$  ( $0.5 \geq x \geq 1$ ) above R.T. In the two-phase region ( $0.2 < x < 0.5$ ) the intensity  $I_{2\omega}$  falls off according to the linear law with the decrease of the amount of the first component in the mixture. In the second system there are two noncentrosymmetric phases: one based on the  $\text{SbNbO}_4$  ( $0 \leq x < 0.32$ ) and the other based on the orthorhombic  $\alpha$ - $\text{SbSbO}_4$  ( $0.48 < x \leq 1$ ), both phases coexisting at intermediate values of  $x$ . The temperature dependence of  $I_{2\omega}$  in the one-phase region corresponds to the law  $P_S \sim (T_C - T)^{1/2}$  specific to the ferroelectric-type phase transitions of the second order. The Curie temperature rises with  $x$  in both ferroelectric phases and reaches 920 K for  $\alpha$ - $\text{SbSbO}_4$ . The comparison of intensities of SHG-signals for the extreme components of the second system at R.T. leads to the estimation:  $P_S(\text{SbSbO}_4) \approx 0.1 P_S(\text{SbNbO}_4)$ , which agrees with the known structural data. The monoclinic  $\beta$ -modification of  $\text{SbSbO}_4$  has also been studied and found to be centrosymmetric and possess the properties of the linear dielectric.

05.2-14 THE STUDY OF THERMAL EXPANSION OF DI- AND TRIOCTAHEDRAL MICA. By M.S.Metsik, V.M.Kalichman, G.A.Kuznetsova, Department of Solid State Physics, Irkutsk State University, Irkutsk, USSR.

The thermal expansion of muscovite and phlogopite crystals in the  $[001]$  crystallographic direction has been studied by the low-temperature X-ray diffraction method. The investigation has been made in the interval of 80 - 300 degrees K. The significant difference of thermal expansion for the crystals studied is observed. The dependence of thermal expansion coefficient on the temperature is nonlinear and may be described as follows:

$$\alpha = A + BT + CT^2,$$

where the coefficients  $A$ ,  $B$ ,  $C$  have the values for muscovite  $7.3 \cdot 10^{-6} T^{-1}$ ;  $3.4 \cdot 10^{-8} T^{-2}$ ;  $-2.1 \cdot 10^{-11} T^{-3}$  and for phlogopite  $3.8 \cdot 10^{-6}$ ;  $4.6 \cdot 10^{-8}$ ;  $-3.6 \cdot 10^{-11}$  respectively.

The thermal expansion coefficient for muscovite is about twice that for phlogopite in the temperature interval concerned. It may be explained by a loosely packed octahedral layer for muscovite and by a closely hophrized tetrahedral nets. This genetic defect of the crystal structure gives rise to weakening bond forces and increasing the value of the coefficient  $\alpha$  in the  $[001]$  direction for muscovite as compared with the coefficient of much more perfect trioctahedral phlogopite crystal. At the same time  $\alpha$  of phlogopites considerably increases with temperature due to the higher interlayer water content.

05.2-15 HIGH TEMPERATURE CRYSTAL CHEMISTRY OF NORMAL PARAFFINS. By S.K.Filatov<sup>1</sup>, E.N.Kotelnikova<sup>1</sup>, E.A.Aleksandrova<sup>2</sup>. <sup>1</sup>Department of Crystallography, Leningrad University, Universitetskaya nab., 7/9, Leningrad, 199164, USSR, <sup>2</sup>Grozny Petroleum Institute, Ordzhonikidze sq., 100, Grozny, 264902, USSR. Investigations of polymorphic transformations and structural deformations of paraffins with changing temperature can be considered as model experiments with respect to similar investigations of high molecular compounds and natural paraffins. Thermal deformations, polymorphic transformations and melting of normal paraffins  $\text{C}_n\text{H}_{2n+2}$  with odd numbers  $n=17, 19, 21$  and 23 have been studied by the powder thermooptogenography method. Common features corresponding to the four stages whose temperatures of proceeding and melting rise with the increase of number  $n$  are distinguished in the thermal deformations of all studied paraffins. Quantitative structural justification of the deformation nature is given using the principle of the aliphatic chains rotation around their axes. Orthorhombic-hexagon transformation (type II) is recorded only for paraffin with  $n=23$  at 39.5 C. This is not inconsistent with the data of A.Muller (1932) obtained by thermooptogenographical method and is at variance with the results of investigations of A.A.Sherer et al. (1956) in which, on the basis of the high temperature mass-spectrometry, the existence of polymorphic transformation for all paraffins with  $n > 8$  has been reported. The data on the temperatures of polymorphic transformations of paraffins and their structural conditions are useful for creating paraffins of preset plasticity.

05.2-16 CRYSTAL STRUCTURES AND CHARGE CARRIER LOCALIZATION IN BINARY OXIDES. By B. Güttler and E. Salje, Institut für Kristallographie und Petrographie, Universität Hannover, Welfengarten 1, 3000 Hannover 1, Federal Republic of Germany.

The crystal structures of binary tungsten oxides  $\text{WO}_{3-x}$  are closely related to the  $\text{ReO}_3$  type with additional corner-sharing octahedra in a network of edge-sharing octahedra (S.G. =  $Pc$ ,  $P2/n$ ,  $P\bar{1}$ ,  $P2/m$ ).

Conductivity measurements and optical experiments show that two electrons are released for each block of four corner-sharing octahedra. These carriers induce semiconducting behaviour for compounds  $\text{WO}_3 - \text{WO}_{2.90}$  and metallic conductivity for  $\text{WO}_{2.90} - \text{WO}_{2.72}$ . At  $\text{WO}_{2.90}$  an Anderson transition takes place. In the semiconducting phase, local structural deformations couple with the electrons under the formation of polarons. For the first time, the simultaneous appearance of polarons and electrons was found in the metallic phase. In compounds with smaller electron concentration than at the Anderson transition ( $\text{WO}_{2.90}$ ) all carriers are found to form polarons. Structurally, the Anderson transition takes place at the borderline between phases containing chains of corner-sharing octahedra along  $\{102\}$  and  $\{103\}$ .