

microscopy have been applied to this system. At least for the experimental conditions employed, the structure of the congruently melting  $4\text{Nb}_2\text{O}_5 \cdot 9\text{WO}_3$ , with 4/12 of pentagonal tunnels occupied, dominates the stability field. However, structures with 6/16 sites in a  $2 \times 2$  TTB superlattice, and with 7/20 sites in a  $5 \times 1$  TTB superlattice occupied form quite extended domains in a  $4\text{Nb}_2\text{O}_5 \cdot 9\text{WO}_3$  matrix. In addition, the structure with 5/16 sites in a  $2 \times 2$  TTB superlattice forms domains in preparations richer in  $\text{WO}_3$  than  $4\text{Nb}_2\text{O}_5 \cdot 9\text{WO}_3$ , and this  $2\text{Nb}_2\text{O}_5 \cdot 5\text{WO}_3$  structure itself shows evidence of ordered intergrowth with the  $2\text{Nb}_2\text{O}_5 \cdot 7\text{WO}_3$  characterised electron microscopically by Iijima. The status of these ordered domain structures is discussed. Metastable structures may be effectively stabilised by coherent intergrowth with structures that are absolutely stable.

*Nucleation Mechanism during Low Temperature Decomposition of Ammonium Perchlorate.* E. F. KHAIRETDINOV, T. V. MULINA, AND V. V. BOLDYREV. Institute of Chemical Kinetics and Combustion, Siberian Branch of the Academy of Sciences of the U.S.S.R., Novosibirsk, 90. It is shown that proton-acceptor additions are effective inhibitors of the nucleation process of low-temperature decomposition of ammonium perchlorate (AP). In contrast to this, addition of  $\text{ClO}_3^-$  ion is a catalyst for the decomposition of AP: it increases the rate of nucleation  $V_n$  and the maximum concentration of nuclei  $N_{\text{max}}$  and decreases the induction period of nucleation  $\tau$ . It is shown that addition of  $\text{ClO}_3^-$  ion is present in the purest commercial samples of AP. It is thought that the initiator of nucleation is  $\text{HClO}_3$ , i.e.,  $V_n = [\text{H}^+] \times [\text{ClO}_3^-]$ . The dependence which is demonstrated agrees very well with experimental data on the influence of addition of proton donors and acceptors and also of additions of  $\text{ClO}_3^-$  ions on  $V_n$ . On the basis of this mechanism, means of regulating the temperature of initiation of AP decomposition are suggested. An explanation of the photosensitivity of AP exposed to the uv band is proposed.

*On the Problem of Polymorphism and Fusion of Lanthanide Trifluorides. I. The Influence of Oxygen on Phase Transition Temperature.* B. P. SOBOLEV, P. P. FEDOROV, AND D. B. SHTEYNBERG. Institute of Crystallography of the Academy of Sciences of the USSR, Lenisky pr. 59, Moscow B-117333, U.S.S.R. AND B. V. SINITSYN AND G. S. SHAKHKALAMIAN, State Institute of the Rare-Metal Industry, Moscow, U.S.S.R. The details of using thermal analysis (TA) in the investigation of lanthanide trifluorides are examined. By examining the literature on the problem of phase transitions in  $\text{LnF}_3$  ( $\text{Ln} = \text{lanthanum}$  and the lanthanides) it is established that the basic reason for disagreement among the data of various authors is in most cases lack of control of pyrohydrolysis of  $\text{LnF}_3$ . For the first time the TA method is used to study parts of the state diagrams of the  $\text{LnF}_3\text{-Ln}_2\text{O}_3$  systems ( $\text{Ln} = \text{Gd, Tb, Ho, Er, and Y}$ ). Phases  $\text{LnF}_{3-2x}\text{O}_x$  were  $0 \leq x \leq 0.2$ , which were not known earlier, are discovered. According to the type of interaction of  $\text{LnF}_3$  with the corresponding  $\text{Ln}_2\text{O}_3$ , the trifluoride series is broken down into several groups corresponding to the structural type in which the  $\text{LnF}_3$  crystallizes. The portions of the state diagrams of the  $\text{LnF}_3\text{-Ln}_2\text{O}_3$  systems that were studied permit us to explain the reasons for contradictions in existing data on the temperatures of phase transformations in  $\text{LnF}_3$ .

*On the Problem of Polymorphism and Fusion of Lanthanide Trifluorides. II. Interaction of  $\text{LnF}_3$  with  $\text{MF}_2$  ( $M = \text{Ca, Sr, Ba}$ ), Change in Structural Type in the  $\text{LnF}_3$  Series, and Thermal Characteristics.* B. P. SOBOLEV, P. P. FEDOROV, AND N. L. TKACHENKO. Institute of Crystallography of the Academy of Sciences of the USSR, Lenisky pr. 59, Moscow B-117333, U.S.S.R. and K. B. SEIRANIAN, Erevan State University, Erevan, U.S.S.R. The results are presented of a study of the interaction of  $\text{LnF}_3$  with  $\text{MF}_2$  ( $M = \text{Ca, Sr, Ba}$ ) for 34 binary systems of the  $\text{LnF}_3\text{-MF}_2$  type in concentration range 60–100 mol % of  $\text{LnF}_3$ . It is shown that in this range the type of interaction of the components in the  $\text{LnF}_3\text{-MF}_2$  systems is similar to that in the  $\text{LnF}_3\text{-Ln}_2\text{O}_3$  systems. There is discussed the problem of stabilizing different structural types of  $\text{LnF}_3$  (tysonite and  $\alpha\text{-YF}_3$ ) during the isomorphous replacement of  $\text{Ln}^{3+}$  by  $M^{2+}$  and  $2\text{F}^{-1}$  by  $\text{O}^{2-}$  with formation of solid solutions  $\text{Ln}_{1-x}\text{M}_x\text{F}_{3-x}$  and  $\text{LnF}_{3-2x}\text{O}_x$ , respectively. In the case of congruent fusion of these phases, the coordinates of the maximum on the fusibility curve (according to composition) are regularly displaced to the side of pure  $\text{LnF}_3$  with a decrease in the atomic number of the lanthanide. The vacancy stabilized phases are typical examples of variable composition compounds (berthollides). On the basis of data on the interaction of components in the  $\text{LnF}_3\text{-Ln}_2\text{O}_3$  and  $\text{LnF}_3\text{-MF}_2$  systems, problems of polymorphism and changes of structural type in the  $\text{LnF}_3$  series are discussed. Fusion and polymorphic transformation temperatures are given for  $\text{LnF}_3$  with control of oxygen content in the specimens after thermal analysis.