

## Abstracts of Forthcoming Articles

*Microscopic Observations on the Thermal Decomposition of  $\alpha$ -Aluminum Hydride.* P. J. HERLEY, O. CHRISTOFFERSON, AND J. A. TODD, Department of Materials Science and Engineering, State University of New York, Stony Brook, New York 11794. The various isothermal and photolytic decomposition stages of  $\alpha$ -aluminum hydride have been examined by scanning electron microscopy. The pristine material consists of cuboids, 50–100  $\mu\text{m}$  on a side, some of which are contact- or interpenetrating twins. The interpenetrating twin axis appears to be the [001] body diagonal of the cuboids. The cuboids' surface, which has been chemically treated to promote thermal stability, contains faceted pits whose sides lie along close-packed directions. The pit interiors show evidence of layering. During the thermal induction period, patches containing acicular filaments, each  $\sim 0.005 \mu\text{m}$  in diameter and  $\sim 0.3 \mu\text{m}$  in length, of Al metal are formed and are dispersed randomly on the internal crystal surfaces. During the acceleratory period, a large number of additional patches appear in which some of the filaments cluster together to form small clumps. The acicular filaments in all patches thicken and increase slightly in length as the reaction proceeds. Later in the acceleratory period, bubbles (0.2–3.5  $\mu\text{m}$  in diameter) appear. The bubbles are randomly distributed throughout the cuboid and produce isolated volumes ( $\sim 2$  to  $7 \mu\text{m}$  in diameter) of partially reacted  $\text{AlH}_3$ . Eventually, the filaments spread over the entire internal substructure of the cuboid. However, although completely decomposed, the cuboid remains intact. Preexposure to  $1.0 \times 10^9 \text{ R } ^{60}\text{Co } \gamma$ -rays blackens the surface and produces a "rougher" external surface with some densely decomposed patches and many more filaments. Additional patches containing denser clusters of acicular nuclei were observed in the surface after uv photolysis at room temperature and at  $150^\circ\text{C}$ . At  $150^\circ\text{C}$  delamination of the surface layer occasionally occurs in the coirradiated material. The increased number of nuclei formed by preirradiation and uv photolysis confirm kinetic studies which postulate the presence of additional nuclei formed by the irradiation.

*The Infrared Spectra, Phase Transition, and Structural Properties of Tetraethylammonium Hexafluoroantimonate ( $\text{C}_2\text{H}_5$ )<sub>4</sub>NSbF<sub>6</sub>.* W. H. J. DE BEER, A. M. HEYNS, P. W. RICHTER, AND J. B. CLARK, National Physical Research Laboratory, Council for Scientific and Industrial Research, P.O. Box 395, Pretoria 001, Republic of South Africa.  $(\text{C}_2\text{H}_5)_4\text{NSbF}_6$  (TEAHFA) is face-centered cubic with  $a = 11.487 \text{ \AA}$  at ambient temperature and undergoes a first-order phase transition at 246 K on cooling and at 272 K on heating. The infrared spectra of TEAHFA confirm the cubic structure of the room temperature phase I in which no evidence could be found for the existence of hydrogen bonds between the cations and anions.

*Studies on the Compounds in Ba-Fe-S System. III. Phase Relation of  $\text{Ba}_{1+x}\text{Fe}_2\text{S}_4$  with Infinitely Adaptive Structure.* N. NAKAYAMA, K. KOSUGE, AND S. KACHI, Department of Chemistry, Faculty of Science, Kyoto University, Kyoto 606, Japan. Samples of infinitely adaptive phase  $\text{Ba}_{1+x}\text{Fe}_2\text{S}_4$  [or  $\text{Ba}_p(\text{Fe}_2\text{S}_4)_q$ ;  $p, q$ : integer] were carefully prepared by changing nominal composition and annealing temperature  $T_a$ . The single-phase materials, defined in this paper as a member of the infinitely adaptive series  $\text{Ba}_p(\text{Fe}_2\text{S}_4)_q$ , were obtained by the addition of excess sulfur in the nominal composition range  $0.05 \leq x \leq 0.20$  at  $T_a$  ranging from 650 to  $880^\circ\text{C}$ . X-Ray powder diffraction showed the existence of many members of the  $\text{Ba}_p(\text{Fe}_2\text{S}_4)_q$  series. The supercell periodicity was markedly dependent on  $T_a$ . The composition of reaction products estimated from X-ray diffraction, a method which was proposed by Grey based on crystallographic consideration, deviated in practice from the nominal composition. This fact suggests random distribution of Ba and Fe vacancies.

*Crystal Structure and Charge Carrier Concentration of  $\text{W}_{18}\text{O}_{49}$ .* K. VISWANATHAN, K. BRANDT, AND E. SALJE, Mineralogisches Institut, Hannover, West Germany. The electrical resistivity of the tungsten oxide,  $\text{W}_{18}\text{O}_{49}$ , is  $1.75 \times 10^{-3} \Omega \text{ cm}$  along the needle axis. The charge carrier density, as determined by reflectivity measurements, is  $1.87 \times 10^{22} \text{ cm}^{-3}$ , thereby indicating that most of the charge carriers are delocalized. Hence the smaller conductivity along the needle axis than that expected for such charge carrier concentrations must be found in the structure, which has been refined using the data collected with an automatic diffractometer. The structure consists of  $\text{WO}_6$  and  $\text{WO}_7$  polyhedra