

1100 nm. The EPR spectra show the existence of the radical cation with an unpaired electron per molecule, also there can be seen a dependence of the bandwidth on the  $R_2$  substituents. Measurements of electrical conductivity show a semiconductor behavior in the studied temperature range, the values show as well a dependence of conductivity on  $R_3$ . The estimation of the drift mobility of charge carriers seems to indicate a hopping mechanism for the charge conduction.

*Paramagnetic Defects in  $\alpha$ - $W_xV_2O_5$ .* JACQUES LIVAGE, CHAKIB R'KHA, DOMINIQUE BALLUTAUD, AND JEAN-CLAUDE GRENET, Spectrochimie du Solide, Université Paris VI 4, place Jussieu, Paris 5e, France. Paramagnetic defects in  $\alpha$ - $W_xV_2O_5$  have been studied by ESR. A model is proposed where the unpaired electron arising from a valence induction effect remains localized on a single vanadium ion near the  $W^{6+}$  along the  $b$  direction. Introducing  $W^{6+}$  leads to a lattice distortion which is more important than in the case of  $Mo^{6+}$ . A slight displacement of vanadium along the  $a$  direction is observed in the defect,  $V^{4+}$  showing a stronger tendency toward octahedral coordination than  $V^{5+}$ .

*Investigation of the Surface Composition of NiO-MgO Solid Solutions by X-Ray Photoelectron Spectroscopy.* A. CIMINO, B. A. DE ANGELIS, G. MINELLI, T. PERSINI, AND P. SCARPINO, Laboratori Ricerche di Base, Assoreni, 00015 Monterotondo, Roma, Italy. The surface composition of NiO-MgO solid solutions has been investigated by XPS. It has been found that no appreciable deviation from bulk composition is present, or, if present, it goes in the direction of a slight depletion in  $Ni^{2+}$  ions at the surface. The approximations involved and the problems encountered in the determination of the surface composition of air-exposed oxide samples are discussed.

*The Structure of Orthorhombic  $Na_2Ti_9O_{19}$ , A Unit Cell Twinning of Monoclinic  $Na_2Ti_9O_{19}$ , Determined by 1-MV High-Resolution Electron Microscopy.* YOSHIO BANDO, MAMORU WATANABE, AND YOSHIZO SEKIKAWA, National Institute for Researches in Inorganic Materials, Sakura-mura, Niihari-gun, Ibaraki 300-31, Japan. The crystal structure of the orthorhombic disodium nonatitanate,  $Na_2Ti_9O_{19}$ , has been determined on the basis of 1-MV high-resolution structure images, in which each site of the titanium and sodium atoms is clearly resolved. The crystal has an orthorhombic symmetry with lattice parameters  $a = 12.2$ ,  $b = 3.78$ , and  $c = 30.1$  Å. The space group of the crystal is either  $Ccmm$  or  $Cc2m$ . The crystal structure of the orthorhombic nonatitanate is closely related to that of the monoclinic nonatitanate reported previously in which the structure contains the sodium titanium dioxide bronze-type units connected by the bridging  $TiO_6$  octahedra. The orthorhombic crystal can be described in terms of a unit cell twinning of the monoclinic crystal. It is shown that migrations of sodium ions occur by electron beam irradiation.

*Metal Telluromolybdates of the Type  $MTeMoO_6$ .* P. FORZATTI AND P. TITTARELLI, Stazione Sperimentale per i Combustibili, 20097 S. Donato Milanese (Milano), Italy. The solid-state reactions of  $M\text{MoO}_4$  ( $M = \text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ , and  $\text{Ni}^{2+}$ ) and orthorhombic  $\text{TeO}_2$  were investigated. A new metal telluromolybdate  $\text{MgTeMoO}_6$  was obtained in the case of Mg; its structure belongs to the orthorhombic system with unit cell dimensions  $a = 5.262$  Å,  $b = 5.028$  Å,  $c = 8.880$  Å.  $\text{Fe}_2(\text{MoO}_4)_3$  and a new compound were formed in the case of Fe. The new compound is made up with  $\text{Fe}^{3+}$  ions and its chemical formula cannot be recognized as  $\text{FeTeMoO}_6$ . In the case of Ni a complex reaction mixture is obtained. An explanation is given of the ability of  $M^{2+}$  ions to form the metal telluromolybdates. The catalytic properties of  $\text{MgTeMoO}_6$  are discussed and compared to those of the other metal telluromolybdates.

*$Ba_3WFe_2O_9$  ( $P6_3/mmc$ ) and  $Ba_3WFe_2O_{8.42(5)}$  ( $Fm3m$ ): Comparative Study of the Crystallographic and Magnetic Properties.* G. MATZEN AND P. POIX, Département Science des Matériaux, 1, rue Blaise Pascal, B.P. 296/R8, 67008 Strasbourg Cedex, France.  $Ba_3WFe_2O_9$  has a hexagonal structure which belongs to space group  $P6_3/mmc$ . Heated at 1350°C under a stream of helium, this compound gives an oxygen-deficient phase whose structure is an ordered cubic one (space group  $Fm3m$ ). This passage from a hexagonal structure to a cubic one is consistent with the decrease of the Goldschmidt tolerance factor resulting from the  $\text{Fe}^{3+}$  partial reduction.  $Ba_3WFe_2O_{8.42(5)}$  (cubic) was compared with  $Ba_3WFe_2O_9$  (hexagonal) and  $\text{Sr}_3WFe_2O_{8.85(3)}$  (cubic) as to the crystallographical and magnetic properties. The study of the thermal stability in air for  $Ba_3WFe_2O_{8.42(5)}$  revealed a reoxidation in several steps and the existence of a new cubic compound, stable in air over a broad range of temperature, and whose formula may be written  $Ba_3WFe_2O_{8.71(5)}$ .