

$\text{SrCoO}_{3-x}$ ,  $(\text{La}_{1-x}\text{Sr}_x)\text{CoO}_3$  ( $0.5 \leq x \leq 1.0$ ) and  $\text{Sr}(\text{Co}_{1-x}\text{Mn}_x)\text{O}_3$  ( $0 \leq x \leq 1.0$ ). From the result, it is found that  $\text{Sr}^{2+}$  and  $\text{La}^{3+}$  ions strongly affect the spin state of the  $\text{Co}^{3+}$  ion and that the  $\text{Mn}^{4+}$  ion located at the octahedral site affects the spin state of  $\text{Co}^{4+}$  ion. The magnetic properties ( $T_c$ ,  $T_\theta$ , and  $\sigma$ ) are explained by the magnetic interaction  $\text{Co}^{3+}-\text{O}-\text{Co}^{3+}$ ,  $\text{Co}^{3+}-\text{O}-\text{Co}^{4+}$ ,  $\text{Co}^{4+}-\text{O}-\text{Co}^{4+}$ ,  $\text{Mn}^{4+}-\text{O}-\text{Mn}^{4+}$ , and  $\text{Mn}^{4+}-\text{O}-\text{Co}^{4+}$  in these systems.

*A New Monoclinic Phase in the  $\text{Fe}_2\text{O}_3-\text{TiO}_2$  System. I. Structure Determination and Mössbauer Spectroscopy.* M. DROFENIK,\* L. GOLIC, D. HANZEL, V. KRASEVEC, A. PRODAN, M. BAKKER, AND D. KOLAR. Jozef Stefan Institute, E. Kardelj University, Jamova 39, 61000 Ljubljana, Yugoslavia. Single crystals with compositions within the  $\text{Fe}_2\text{O}_3-\text{TiO}_2$  system were grown from a flux containing various amounts of the basic oxides. Apart from the known pseudo-brookite ( $\text{Fe}_2\text{TiO}_5$ ) and rutile ( $\text{TiO}_2$ ) structures, a new monoclinic polytype of  $\text{Fe}_2\text{TiO}_5$  was found, which was isostructural with  $\text{V}_3\text{O}_5$ . The structure was determined by X-ray analysis and Mössbauer spectroscopy contributed data on hyperfine parameters and the magnetic ordering temperature.

*A New Monoclinic Phase in the  $\text{Fe}_2\text{O}_3-\text{TiO}_2$  System. II. The Defect Structure.* V. KRASEVEC,\* A. PRODAN, M. BAKKER, M. DROFENIK, L. GOLIC, D. HANZEL, AND D. KOLAR, Jozef Stefan Institute, E. Kardelj University, Jamova 39, 61000 Ljubljana, Yugoslavia. Defects in monoclinic  $\text{Fe}_2\text{TiO}_5$  were studied by electron microscopy and diffraction. The monoclinic structure found, which is isostructural with  $\text{V}_3\text{O}_5$ , can be derived in a simple way from a hexagonal close packed structure and can be considered as a member of the family of crystallographic shear structures, derived from rutile. Two different slips corresponding to two hexagonal basal ones, were found to cause stacking faults, antiphase boundaries, and two different crystallographic shear planes.

*La solution solide  $\text{Cr}_{1-x}\text{Ir}_x\text{O}_2$ .* P. MAESTRO, G. DEMAZEAU, ET M. POUCHARD,\* Laboratoire de Chimie du Solide, Université de Bordeaux I, 351, cours de la Libération, 33405 Talence Cedex, France. A new solid solution  $\text{Cr}_{1-x}\text{Ir}_x\text{O}_2$  ( $0 \leq x \leq 1$ ) has been prepared using oxidizing agents under pressure. The magnetic study shows the importance of the spin-orbit coupling and the weakening of the ferromagnetic interactions with increasing iridium content.

*$\text{Ln}(\text{Fe}^{3+}, \text{M}^{2+})\text{O}_4$  Compounds with Layer Structure [ $\text{Ln} = \text{Y}, \text{Er}, \text{Tm}, \text{Yb}, \text{and Lu}; \text{M} = \text{Mg}, \text{Mn}, \text{Co}, \text{Cu}, \text{and Zn}$ ].* N. KIMIZUKA\* AND E. TAKAYAMA, National Institute for Research in Inorganic Materials, 1-1, Namiki, Sakuramura, Niiharigun, Ibaraki-ken, Japan 305. A series of new compounds  $\text{Ln}(\text{Fe}^{3+}, \text{M}^{2+})\text{O}_4$  [ $\text{Ln} = \text{Y}, \text{Er}, \text{Tm}, \text{Yb}, \text{and Lu}; \text{M} = \text{Mg}, \text{Mn}, \text{Co}, \text{Cu}, \text{and Zn}$ ] were successfully synthesized and their lattice constants were determined. These compounds have the same crystal structure as  $\text{YbFe}_2\text{O}_4$  and  $\text{Fe}^{3+}$  and  $\text{M}^{2+}$  are both surrounded by five oxygen ions forming a trigonal bipyramid. The synthetic conditions are presented. They are strongly dependent upon the constituent cations of the compound.

*Electrical and Thermoelectric Properties of Undoped MnO Single Crystals.* M. PAI AND J. M. HONIG,\* Department of Chemistry, Purdue University, West Lafayette, Indiana 47907. The electrical resistivity and Seebeck coefficients of pure MnO single crystals have been measured above the Néel temperature. The material is p type in this temperature range. The results are interpreted on the basis of small-polaron hopping involving charge carriers in one or more sets of transport levels.

*Crystal Chemistry of  $\text{M}_{12}\text{P}_7$  Phases in Relation with the  $\text{M}_2\text{P}$  Phosphides.* S. MAAREF, R. MADAR, P. CHAUDOUET, J. P. SENATEUR,\* AND R. FRUCHART, E.R. 155, Section de Genie Physique ENSIEG, Domaine Universitaire, B.P. 46, 38402 St. Martin d'Heres, France. A structural model for the description of transition metal phosphides has been applied to the determination of the structural relation between  $\text{M}_{12}\text{P}_7$  and  $\text{M}_2\text{P}$  hexagonal phases. The correctness of this approach has been tested by the prediction of the substitutional ordering in  $\text{M}_{12}\text{P}_7$  phases.

*Lattice Vibration Spectra. XXVI. Far-Infrared Spectra of the Ternary Skutterudites  $\text{CoP}_{3-x}\text{As}_x$ ,  $\text{CoAs}_{3-x}\text{Sb}_x$ , and  $\text{MGe}_{1.5}\text{Y}_{1.5}$  ( $\text{M} = \text{Co}, \text{Rh}, \text{Ir}; \text{Y} = \text{S}, \text{Se}$ ).* H. D. LUTZ\* AND G. KLICHE. Laboratorium für Anorganische Chemie der Universität Siegen, Adolf-Reichwein-Strasse, D-5900 Siegen 21, West Germany. The infrared spectra of the skutterudite solid solutions  $\text{CoP}_{3-x}\text{As}_x$  and  $\text{CoAs}_{3-x}\text{Sb}_x$  and the ordered ternary skutterudites  $\text{MGe}_{1.5}\text{Y}_{1.5}$  ( $\text{M} = \text{Co}, \text{Rh}, \text{Ir}; \text{Y} = \text{S}, \text{Se}$ ) have been studied. In the system  $\text{CoP}_{3-x}\text{As}_x$  a complete mixed crystal series has been obtained. In the system  $\text{CoAs}_{3-x}\text{Sb}_x$  a miscibility gap has been found. The infrared spectra of the mixed crystals are influenced