

leads to the decrease of the orthorhombic deformation and of the Néel temperature and, simultaneously, to an increase of the ferromagnetic contribution. The latter effect is explained from the suggested distribution of the cations $(\text{Pr}_{1-x}^{3+}\text{Mn}_x^{2+})_A(\text{Mn}_{1-x}^{3+}\text{Mn}_x^{4+})\text{O}_3^{2-}$ by the double exchange of $\text{Mn}^{3+} - \text{Mn}^{4+}$ pairs at the *B*-sublattice.

Ordering in $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - $\text{Pb}(\text{Mg}_{1/2}\text{W}_{1/2})\text{O}_3$ Solid Solutions. A. AMIN, R. E. NEWNHAM, L. E. CROSS, S. NOMURA, AND D. E. COX, Materials Research Laboratory, The Pennsylvania State University, University Park, Pennsylvania. Compositional ordering was found to occur in the ferroelectric $(1-x)\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ -antiferroelectric $x\text{Pb}(\text{Mg}_{1/2}\text{W}_{1/2})\text{O}_3$ solid solution system. X-Ray diffraction and neutron profile fitting structure refinement were used to refine one such composition with $x = 0.9$. The paraelectric structure of compositions with $x < 0.2$ is that of the disordered perovskite (space group *Pm3m*), whereas for $2.0 \leq x < 1.0$ the structure is that of ordered perovskite (space group *Fm3m*). The oxygen octahedra in the ordered state are regular but no longer equivalent.

Studies of Spinels. VII. Order-Disorder Transition in the Inverse Germanate Spinels $\text{Zn}_{2-x}(\text{Co}, \text{Ni})_x\text{GeO}_4$ ($x \approx 1$). J. PREUDHOMME AND P. TARTE, University of Liege, Institute of Chemistry, B-4000 Sart-Tilman par Liege 1, Belgium. A series of germanate spinels $\text{Zn}_{2-x}(\text{Ni}, \text{Co})_x\text{GeO}_4$ has been synthesized and investigated by X-ray diffractometry and infrared spectroscopy. Synthesis at 1200°C leads to cubic phases characterized by an inverse, disordered distribution of Ge and bivalent cations (essentially Ni or Co) over the octahedral sites; however, the presence of some short-range order is suggested by the infrared spectrum. Tempering at an appropriate temperature (between 800 and 900°C, depending on the Co/Ni ratio) leads to tetragonal spinel phases, corresponding to the 1 : 1 order between Ge and bivalent cation on octahedral sites. The transformation is sluggish and proceeds at a significant rate only in a narrow temperature range, just below the transition temperature. A comparison with the behavior of known inverse, ordered titanate spinels shows that, within the family of inverse II-IV spinels $\text{M}_2^{\text{II}}\text{M}^{\text{IV}}\text{O}_4$, the ratio of the octahedral cationic radii $r_{\text{M}^{\text{II}}}/r_{\text{M}^{\text{IV}}}$ is one of the factors determining the order-disorder transition temperature, and the importance of the tetragonal distortion.

Lanthanoid-Nickel Phosphides with ThCr_2Si_2 -Type Structure. WOLFGANG JEITSCHKO AND BEATE JABERG, Anorganische Chemie III, Universität Dortmund, Postfach 500500, D-4600 Dortmund 50, West Germany. The new compounds YNi_2P_2 and LnNi_2P_2 ($\text{Ln} = \text{La}, \text{Ce}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Tb}, \text{Dy}, \text{Ho}, \text{Er}, \text{Tm}$) were prepared by sintering the elemental components in silica tubes. Well-developed crystals were obtained using tin as a flux. They crystallize with the ThCr_2Si_2 (CeGa_2Al_2)-type structure which was refined from single-crystal X-ray data for EuNi_2P_2 to a conventional *R* value of 0.049 for 118 unique structure factors. While the P atoms in formally isotypic EuCo_2P_2 are isolated from each other, they form pairs in EuNi_2P_2 . This results in a different *c/a* ratio and an entirely different bonding situation. A comparison of cell volumes shows that Eu in EuNi_2P_2 has an intermediate valence.

Structure and Magnetic Properties of Sulfides of the Type CdRe_2S_4 and $\text{Mg}(\text{Gd}_x\text{Yb}_{1-x})_2\text{S}_4$. L. BEN-DOR AND I. SHILO, Department of Inorganic and Analytical Chemistry, The Hebrew University of Jerusalem, Israel. CdRE_2S_4 ($\text{RE} = \text{Gd}, \text{Tb}, \text{Dy}, \text{Ho}, \text{Er}, \text{Tm}, \text{and Yb}$) and $\text{Mg}(\text{Gd}_x\text{Yb}_{1-x})_2\text{S}_4$ were prepared by solid-state reactions. All the cadmium-containing compounds are cubic, i.e., the Th_3P_4 structure for Gd, Tb, and Dy and the spinel type for all the others. The first three compounds were deficient in CdS. In the case of the Mg system, for $x = 1$ the system is cubic Th_3P_4 , for $x = 0$ cubic spinel, and for $0 < x < 1$ orthorhombic MnY_2S_4 (*Cmc2₁*). All the materials studied are paramagnetic above 77°K. Below 77°K in the magnesium family both cubic materials are paramagnetic down to 4.2°K and the orthorhombic materials show magnetic ordering. In the cadmium family all but CdTm_2S_4 show exchange coupling.