the structure of one of the intergrowths using single crystal X-ray diffraction data. For the temperature range studied the *CS* phases are within a few degrees of their melting points, and this is reflected in a departure from complete structural order. The results show both long-range disorder in the intergrowth sequences and also an absence of correlation between the metal atom ordering in one *CS* plane and the next. This disorder is manifested by diffuse scattering in the diffraction patterns. The $(020)_r$ *CS* structures transform reversibly to the well-known $(121)_r$–$(132)_r$ family of ordered rutile *CS* structures below 1450°C.

Magnetic Susceptibility of Single Crystal $Fe_{1-x}S$. J. L. Horwood, M. G. Townsend, and A. H. Webster, Mineral Sciences Laboratories, Canada Centre for Mineral and Energy Technology, Ottawa, Canada K1A 0G1. Stoichiometric FeS is characterized by three phase transitions, one structural at T_α and the others magnetic at T_s and T_N. We have obtained magnetic susceptibility data in the temperatire range 80° to 600°K on single crystals of several compositions of $Fe_{1-x}S$ for $0 \leqslant x \leqslant 0.07$. The magnetic susceptibilities of very nearly stoichiometric FeS show the two transitions well separated [$T_\alpha = 420°K$, $T_s = 445°K$]. In the region of T_s, the spins do not rotate gradually with temperature but flip locally due to a small spread in composition. By comparing the data with that of NiS we infer that FeS is a localized spin antiferromagnet in contrast to NiS, which is generally considered to be an itinerant antiferromagnet. $T_s(x)$ decreases linearly with increasing metal deficiency. This dependence can be partly accounted for by a decrease in the spin-orbit coupling energy arising from increasing covalency; however, we conclude that a concomitant increase in magnetocrystalline anisotropy energy also occurs in this range.

Mossbauer Effect in Single Crystal $Fe_{1-x}S$. J. R. Gosselin, M. G. Townsend, R. J. Tremblay, and A. H. Webster, Mineral Sciences Laboratory, Canada Centre for Mineral and Energy Technology, Ottawa, Canada K1A 0G1. Mossbauer spectra have been recorded for single crystals of very nearly stoichiometric FeS and $Fe_{0.93}S$ at temperatures between 80° and 600°K. The spectra of nearly stoichiometric FeS indicate that the low-temperature 2*C* structure with spins $\|c$ preserves the spin orientation $\|c$ during the structural transformation to 1*C* at T_α (= 420°K). However, because of a miscibility gap, a few percent of the high-temperature 1*C* structure with spins $\perp c$ is present even at 300°K and the concentration of this component increases with temperature. At T_s (= 445°K) the spins in the 1*C* structure that are $\|c$ rotate $\perp c$. In $Fe_{0.93}S$, the hyperfine splittings indicate that the rotation of the spins from $\|c$ to $\perp c$ at 170°K is a first-order process.

Zur Kristallstruktur von FeJ_3O_9. M. Jansen, Institut fur Anorganische und Analytische Chemie der Justus Liebig-Universitat, 63 Giessen, Sudanlage, Germany. Single crystals of FeI_3O_9 were obtained by oxidizing FeI_2 at 520°C and 500 atm oxygen pressure. The crystal structure has been determined and refined by full matrix least-squares procedures using diffractometer data to a final *R*-value of 0.067; the space group is $P6_3$–C_6^6, $a = 9.225$ Å, $c = 5.224$ Å, $c/a = 0.57$. The structure consists of FeO_6-octahedra connected by iodine, each of which is coordinated by three oxygen [d(I–O); 1.89 and 1.90 Å for bridging O; 1.79 Å for terminal O]. The Cr and β-Sc iodates have the same structure.

Phase Equilibria in the System Fe–Fe_2O_3–Lu_2O_3 *at 1200°C*. T. Sekine and T. Katsura, Department of Chemistry, Tokyo Institute of Technology, Tokyo 152, Japan. Phase equilibria in the title system have been established at 1200°C. The following phases were stable: lutetium sesquioxide, hematite, magnetite, wustite, metallic iron, lutetium–iron–perovskite, lutetium–iron–garnet, $LuFe_2O_4$, and $Lu_2Fe_3O_7$. The standard free energy of formation from metallic iron, Lu_2O_3, and oxygen at 1200°C of $LuFe_2O_4$, $Lu_2Fe_3O_7$, $LuFeO_3$, and $Lu_3Fe_5O_{12}$ has been determined to be -100.3 ∓ 0.2, -158.2 ∓ 0.2, -57.5 ∓ 0.3, and -279.1 ∓ 0.9 kcal/mole, respectively.

Preparation, Phase Equilibria, and Crystal Chemistry of Lanthanum, Praseodymium, and Neodymium Hydroxide Chlorides. E. T. Lance and J. M. Haschke, Department of Chemistry, University of Michigan, Ann Arbor, Michigan 48104. The preparation of hydroxide chlorides of lanthanum, praseodymium, and neodymium has been achieved by hydrothermal methods at 550°C and 1530 atm. Three phases [$Ln(OH)_3$, $Ln(OH)_{2.55}Cl_{0.45}$, and $Ln(OH)_2Cl$] have been characterized by analytical and X-ray methods. The observed compositions are closely defined by the $x = 0$, 0.5, and 1 members of the hom-