

# Abstract

The present work tended to combine the large area of interstitially stabilized rare-earth cluster complexes with the field of metal-rich rare-earth-tellurides. The main goal was the synthesis of interstitially stabilized rare-earth cluster complexes with mixed coordination spheres of halogen and tellurium atoms by exploratory syntheses.

New rare-earth tellurides and rare-earth telluride-halides are presented in this work. Beside the rare-earth mono-tellurides YTe, DyTe and TbTe, single crystals of ScTe could be examined by X-ray diffraction for the first time. In addition, a large number of rare-earth sesquitectellurides ( $\text{Y}_2\text{Te}_3$ ,  $\text{Pr}_2\text{Te}_3$ ,  $\text{Gd}_2\text{Te}_3$ ,  $\text{Tb}_2\text{Te}_3$ ,  $\text{Dy}_2\text{Te}_3$ ,  $\text{Ho}_2\text{Te}_3$ ,  $\text{Tm}_2\text{Te}_3$ ,  $\text{Lu}_2\text{Te}_3$ ) were synthesized and characterized by X-Ray single crystal diffraction, so far solely known by X-ray powder diffraction. The magnetic study of this compound class has been augmented by susceptibility measurements of  $\text{Lu}_2\text{Te}_3$ .

Furthermore two isotypic and previously unknown compounds of the type  $\text{SE}_2\text{TeZ}$  are presented with  $\text{Sc}_2\text{TeRu}$  and  $\text{Sc}_2\text{TeRh}$ . These compounds crystallize in the  $\alpha$ -sodium ferrate(III) type of structure. By comparison with other compounds of the  $\text{SE}_2\text{CX}_2$  type previously reported in the literature, structural similarities can be observed.

The knowledge of mixed rare-earth telluride-halides could be expanded by the synthesis of  $\text{La}_3\text{Te}_4\text{Br}$ , which depicts the first representative of this recently established class of compounds. It crystallizes with the  $\text{U}_3\text{Te}_5$  type of structure. The lanthanum atoms are coordinated by dicated trigonal prisms formed by tellurium and bromine atoms. Furthermore the rare-earth-mono-telluride-mono-halides  $\text{LaTeCl}$ ,  $\text{LaTeCl}_{0,89}\text{Br}_{0,11}$ ,  $\text{CeTeCl}$ ,  $\text{PrTeCl}$  and  $\text{NdTeCl}$  were obtained, formerly only represented by  $\text{NdTeF}$ . By means of single crystal X-ray diffraction two different structural modifications of  $\text{LaTeCl}$  and  $\text{CeTeCl}$  (type I: orthorhombic; type II: tetragonal) were determined. By the aid of thermal investigations and temperature dependent X-ray diffraction, the orthorhombic low-temperature phase (type I) could be assigned to the lead dichloride type of structure, whilst the tetragonal high-temperature phase (type II) resembles the lead fluoride chloride- (matlockite-) type.  $\text{LaTeCl}$ ,  $\text{CeTeCl}$  and  $\text{NdTeCl}$  were further characterized by magnetic susceptibility measurements of pure powder samples.