

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 sesquiterellurides (Y_2Te_3 , Pr_2Te_3 , Gd_2Te_3 , Tb_2Te_3 , Dy_2Te_3 , Ho_2Te_3 , Tm_2Te_3 , Lu_2Te_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 Lu_2Te_3 .

Furthermore two isotypic and previously unknown compounds of the type SE_2TeZ are presented with Sc_2TeRu and Sc_2TeRh . These compounds crystallize in the α -sodium ferrate(III) type of structure. By comparison with other compounds of the SE_2CX_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 U_3Te_5 type of structure. The lanthanum atoms are coordinated by dicapped trigonal prisms formed by tellurium and bromine atoms. Furthermore the rare-earth-mono-telluride-mono-halides LaTeCl , $\text{LaTeCl}_{0,89}\text{Br}_{0,11}$, CeTeCl , PrTeCl and NdTeCl were obtained, formerly only represented by NdTeF . By means of single crystal X-ray diffraction two different structural modifications of LaTeCl and 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. LaTeCl , CeTeCl and NdTeCl were further characterized by magnetic susceptibility measurements of pure powder samples.