**Poster Presentations**

[MS24-P12] A systematic crystal chemical study of calcium rich mixed tetrelides.

Michael Jehlea, Julia Steckhana, Caroline Röhr

*Institut für Anorganische und Analytische Chemie, Universität Freiburg, D-79104 Freiburg, Germany.

E-mail: michi@almandine.chemie.uni-freiburg.de

In this work, the systematic investigation of ternary Calcium-rich tetrelides Ca_{x}M_{y} (M=Ge, Sn, Pb) is presented. Therefore, the corresponding isotypic binary phases of the compositions x:y=2:1, 5:3 and 1:1 have been taken as starting points. 2:1: The phases Ca_{2}Sn_{z}Ge_{1−z} crystallize in the well known Co_{2}Si structure type (Pnma) [1]. The noble gas isosteric Sn and Ge ions, accordingly, are substituted against each other in a statistical manner without forming any kind of superstructure and the lattice parameters and unit cell volumes satisfy Vegard’s law. 5:3: Nearly all calcium tetrelides A_{5}M_{3} [2] crystallize in the Cr_{5}B_{3} structure type (I4/mcm) hence also obeying the Zintl concept (5 ·Ca_{2+}+1b[M_{2}]^{6−}+[M]^{4−}). The only exception is Ca_{5}Pb_{3} crystallizing in an own structure type (P6\bar{3}mc). Therefore, it is not remarkable, that the phases containing Ge or Sn also show a continuous phase width Ca_{5}[Sn_{z}Ge_{1−z}] (e. g. z=2.02, I4/mcm, a=795.1(1), c=1506.4(1) pm, R1=0.024), whereas in Ca_{5}Pb_{3} not any lead atom could be substituted by germanium. According to the preferred occupation of the M2 dumbbells by germanium, the coloring of the anions is terminated by size effects only. 1:1: The monotetrelides [2,3] of germanium and tin and the whole series CaSn_{z}Ge_{1−z} both form the CrB structure type (e. g. z=0.37, Cmcm, a=465.6(1), b=1108.0(3), c=411.5(1) pm, R1=0.032) exhibiting zigzag chains (2bM2−). CaPb crystallizes in the AuCu structure type. Hence, it is not surprising, that Ge in CaGe could only be substituted by small amounts of Pb (8%). 3:2−5:3: In the small x:y composition range between 5:3 and 3:2 the compounds Ca_{26}Sn_{17−}


**Keywords:** alkaline earth, germanides, stannides, structure and bonding