

Phase relations in Ag–Ni–Zn–S and Cu–Si–Ni–Sn–S systems

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Starting with pure metals and sulphur in evacuated silica tubes and heating up to 900°C led to several copper- and silver-based compounds in Ag–Ni–Zn–S, Cu–Si–Ni–Sn–S systems. Powder diffraction studies showed either a thiospinel-related structure (cubic, $a \sim 10.3 \text{ \AA}$, sp.gp. $Fd\bar{3}m$) or sphalerite related structure (cubic, $a \sim 5.41 \text{ \AA}$, sp.gp. $F\bar{4}3m$). The possibility of a tetragonal superstructure in some of the silver-based compounds is also investigated. The spinel-related phases were found to crystallize from melts in the temperature range of 670–850°C while sphalerite-related phases crystallized between 850 and 900°C. Single crystals have been obtained by slow cooling. Structural studies of these crystals will be discussed. These materials are interesting with respect to their ion exchange/intercalation of the monovalent ions suitable for use as cathode materials and some of these compounds have interesting electro-optical properties.