SOLUBILITY OF MANGANESE, IRON, COBALT, NICKEL MONOSELENIDES IN CuInSe₂ COMPOUND

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A low-temperature modification of CuInSe₂ compound chalco-pyrite phase is very important photo-electric material. Electric conductivity of this compound changes in jump when its composition deviate from stoichiometry as well as it is doped by various 3d-elements.

In this activity a solubility of Mn, Fe, Co, Ni monoselenides in CuInSe₂ compound is investigated. Samples are synthesized from high-purity elements in vacuum (~0.1Pa) at the 1450K, and annealed at 1000 K during the 200 hours. Samples are investigated using a number of physico-chemical analysis techniques.

A phase diagrams for CuInSe₂-MeSe (Me = Mn, Fe, Co, Ni) systems are established. All these diagrams have guasibinary character. The temperature of sfaleryte-chalcopyrite transition of the CuInSe₂ compound doped by the monoselenides decreases to 50-150K. Decreasing of monoselenides transition temperature is directly related to the amount of doped MeSe phase. At the normal temperature a following amounts of MeSe phase dissolve in the CuInSe₂ compound: 20 mole% of MnSe, 8mole% of FeSe, 3mole% of CoSe, and 1 mole% of NiSe.

Temperature relations of private resistance and conductivity for some samples of formed solid solutions are investigated.