INFLUENCE OF THE RATIOS OF THE IONIC RADII OF CATIONS AND ANIONS ON THE MAGNETIC AND ELECTRICAL PHASE TRANSITIONS IN $A_{1-x}Cu_xCr_2X_4$ (WHERE A = Zn, Cd; X = Se, S)

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9.7 cm

Let us denote: r_t - ionic radius of cations in the tetrahedral positions, r_o - ionic radius of cations in the octahedral positions, r_a - ionic radius of anions creating tetrahedral and octahedral gaps. For all the compounds $Cd_{1-x}Cu_xCr_2X_4$ the ratios r_t/r_a are significantly greater than r_o/r_a , which means that these compounds are ferromagnets and either semiconductors (for $x \leq 0.2$) or metals (for $x \geq 0.9$). Thus, in this case one can say about the semiconductor - metal phase transition forced by the change of Cu concentration [1]. Similar effect is observed for the compounds with zinc but here the semiconductor - metal phase transition is accompanied by the magnetic AF - F phase transition in the region where r_t/r_a becomes lower than r_o/r_a [2].

[1] T. Groń, H. Duda, J. Warczewski, Phys. Rev. **B, 41** (1990) 12424.
[2] J. Krok, J. Spałek, S. Juszczyk, J. Warczewski, Phys. Rev. **B, 28** (1983) 6499.

13.4 cm

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