STRONG ELECTRON CORRELATIONS IN SHORT-RANGE MAGNETIC ORDER AND ELECTRICAL RESISTANCE OF HOMOGENEOUSLY DISORDERED BINARY CRYSTALS

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S u m m a r y

The formation of both the short-range magnetic order and the electrical conductivity in homogeneously disordered binary crystals under the influence of strong electron correlations is considered (by the example of b.c.c.-$Fe_{1-c}Co_c$ alloys). For the description of electron states in a crystal, the multiband model of a tight binding and the method of the cluster expansion for Green's functions and the thermodynamic potential of a disordered crystal are used. Strong electron correlations and the well-developed short-range order of substitutional atoms lead to the appearance of a quasigap in the electron-energy spectrum. The microscopic mechanisms of magnetic ordering and formation of the electrical resistance are concerned with both the Fermi-level position within the quasigap region and the realignment of the electron-energy spectrum with changes of the temperature or the alloying-component concentration. The parameter of pairwise magnetic correlations decreases with increase in the temperature and tends to zero in a vicinity of the Curie temperature. The nonmonotonic concentration dependence of the Fe−Co-alloy electrical resistance is investigated as well. It is caused by strong electron correlations and the magnetic order resulting from these correlations.