MONTE CARLO STUDY OF SELECTIVE MAGNETIC DILUTION IN SPINEL STRUCTURE

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9.7 cm

Spinel structures provide a convenient possibility to study selective magnetic dilution, as the contents of magnetic ions in each of the two sublattices can be to some extent controlled by the choice of the diluting nonmagnetic ion and proper thermal treatment. The selective magnetic dilution has attracted more attention in the last decade when the examples of spin-glass phase existence has been confirmed in dilute ferrite-type compounds. In the present work the results of a Monte Carlo study of selective magnetic dilution in the spinel structure are discussed. Classical Heisenberg model with cubic anisotropy has been used in the simulation. Special coding of the interactions in the local neighbourhood enabled calculations for samples up to 25x25x25 unit cells, with 24 ions each. Three types of selective dilution has been studied: separate dilutions of A and B sublattices as they differ considerably in magnetic frustration and a simultaneous dilution of both sublattices. In all cases the transition temperature dependence on the magnetic ions concentration has been calculated and percolation limits have been determined. The magnetic ordering near the percolation limits is similar to the so called semi spin-glas phase i.e. noncollinear order with short range correlations of the perpendicular magnetisation components is observed. The results are compared for three values of the J_{AA}/J_{AB} and J_{BB}/J_{AB} ratios i.e. for various degree of magnetic competition.

13.4 cm

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