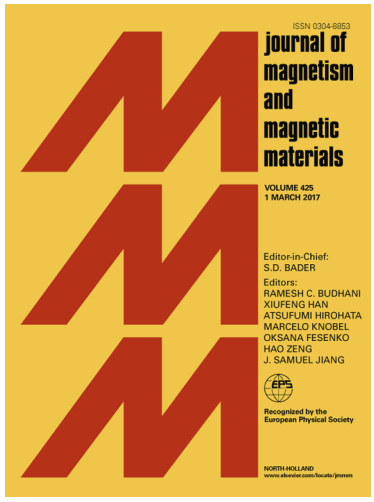

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Magnetic properties of the binary Nickel/Bismuth alloy

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Abstract

Magnetic properties of the binary Nickel/Bismuth alloy (Ni/Bi) are investigated within the effective field theory. The Ni/Bi alloy has been modeled that the rhombohedral Bi lattice is surrounded by the hexagonal Ni lattice. According to lattice locations, Bi atoms have two different magnetic properties. Bi1 atoms are in the center of the hexagonal Ni atoms (Ni/Bi1 single layer) and Bi2 atoms are between two Ni/Bi1 bilayers. The Ni, Bi1, Bi2 and Ni/Bi undergo a second-order phase transition from the ferromagnetic phase to paramagnetic phase at Tc=1.14. The magnetizations of the Ni/Bi alloy are observed as Bi1>Bi2>Ni/Bi>Ni at T<Tc; hence the magnetization of the Bi1 is dominant and Ni is at least dominant. However, the total magnetization of the Ni/Bi alloy is close to magnetization of the Ni at T<Tc. The corcivities of the Ni, Bi1, Bi2 and Ni/Bi alloy are the same with each others, but the remanence magnetizations are different. Our theoretical results of M(T) and M(H) of the Ni/Bi alloy are in quantitatively good agreement with the some experimental results of binary Nickel/bismuth systems.

Keywords: Binary Nickel/Bismuth alloy; magnetization, hysteresis, coercivity, effective field theory

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