Effect of Additional Fe Element on Structural and Magnetic Properties in Cu-Fe-Pd alloy


Institute of Materials Science, University of Tsukuba, Tsukuba, Ibaraki, Japan

aDepartment of Physics, Bahauddin Zakariya University, Multan, Pakistan

takahasi@bk.tsukuba.ac.jp

Structure and magnetic properties of ternary alloys Cu-Fe-Pd were investigated by X-ray diffraction and magnetic susceptibility measurements. By examining additional effect of Fe element in the alloys, the mechanism of phase transition from fcc to bcc-based CsCl-type ordered structure observed in Cu-Pd binary alloys of compositions near 40 at.% Pd has been studied. A phase diagram of Cu-Pd binary alloy system for Pd compositions up to ~50 at.% is quite complicated with various kinds of ordered structures formed from a fcc structure in a disordered phase [1]. Ordered structures and the order-disorder phase transition temperatures in Cu-Fe-Pd ternary alloys were studied by X-ray diffraction measurements. The results show an almost similar phase diagram to that for the binary alloys (Fig.1). On the other hand, magnetic susceptibility of the ternary alloys shows ferromagnetic or spin-glass-like behaviors and depends largely on their atomic order and Fe compositions.


Fig. 1 : Phase transition temperatures of Cu-Fe-Pd alloys (red circles) plotted on the phase diagram of Cu-Pd binary alloy.