Structure of Amorphous Fe_<80>-P_<13>-C_7 by X-Ray Diffraction

X-ray diffraction patterns have been obtained from Cu_{57}-Zr_{43} alloy in both amorphous and liquid states. After calculating the structure factor by means of the common Fourier analysis, the atomic radial distribution function was evaluated from which interatomic distance and coordination number were obtained. In the essential feature of the structure factor in the amorphous state was quite similar to that in the liquid state. There is a good agreement between the structure factor determined in this work and that calculated on the basis of the hard sphere mixture model except for the presence of the splitting of a second peak maximum in the former. These results suggest that the atoms in the nearest neighbour distance in the amorphous state consist mainly of the disorderly distributed atoms as those in the liquid state. But a deformed crystalline-like arrangement of atoms as those in a hcp or fcc structure contributes partly to the short range order in the amorphous state.

Structure of Amorphous Fe_{80}-P_{13}-C_7 by X-Ray Diffraction

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X-ray diffraction patterns have been obtained from Fe_{80}-P_{13}-C_7 alloy in both amorphous and liquid states. Using the common Fourier analysis, the atomic radial distribution function was evaluated from which interatomic distance and coordination number were obtained. The essential feature of the structure in the amorphous state was similar to that in the liquid state. The crystallization process of this alloy during isothermal aging at 330°C was also studied by the same procedures. The results indicated that the initial amorphous structure changes to a second amorphous structure, which in turn, transforms to the stable crystalline phase. This crystallization product was single phase of bcc structure (a_0=2.864 Å). By means of the Fourier analysis, these results led to the conclusion that the initial amorphous structure re-arranges to relax the stress or anisotropic configuration of atoms arising from the rapid quenching and subsequently the crystallization of this alloy occurs by a nucleation and growth mechanism during isothermal aging.

The Magnetic Phase Transition of an Amorphous Fe-P-C and Its Alloys Containing Ni and Cr

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The magnetic phase transition of the amorphous ferromagnetic alloys $Fe_{80}P_{13}C_7$, $Fe_{70}Cr_{10}P_{13}C_7$ and $Fe_{70}Ni_{10}P_{13}C_7$ has been investigated by magnetization and specific heat measurements. From the field dependence of the isothermal magnetization, the critical exponents and the Curie temperature (T_c) of $Fe_{80}P_{13}C_7$ were obtained to be β=0.38±0.02, γ=1.30±0.05, δ=4.47±0.05 and T_c=586.55±0.1°K. These exponents sufficiently satisfy the static scaling law. The specific heat of $Fe_{80}P_{13}C_7$ showed an approximate logarithmic singularity at T_c. The specific heat from Fe_{70}-