

The Internal Friction and Elastic Modulus of Amorphous Pd-Si and Fe-P-C Alloys

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$\text{Si}_{15}\text{B}_{10}$, it was found that the zero magnetostrictive alloys are remarkably soft magnetic materials, while the magnetostrictive alloys have rather large coercive force. To investigate the effect of magnetostriction on the properties of the B-H loop, some fundamental magnetic properties in these alloys were studied. The magnetic domain pattern observed by Bitter's method shows a periodic domain structure consisting of 180° and maze domain walls (the periodicity can be seen along the specimen long axis) in all the magnetostrictive alloys, suggesting the existence of magnetic anisotropy whose easy axis varies locally. The estimated value of the anisotropy energy varies with x similar to the composition dependence of magnetostriction. Torque measurements support the above estimation. The coercive force also varies with x and is nearly proportional to the magnetostriction to magnetization ratio. It is, therefore, considered that the anisotropy is caused by the anisotropic internal stress field, and that the stress fluctuation which inevitably exists is responsible for the large coercive force.

Extremely High Corrosion Resistance of Chromium-Bearing Amorphous Iron Alloys

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Mater. Sci. Eng., **23** (1976), 285. (Proc. 2nd Intern. Conf. on Rapidly Quenched Metals (Section II), MIT, Cambridge, Mass., 1975)

Amorphous iron alloys containing 8 at.% or more chromium did not suffer pitting and crevice corrosion, and no detectable weight change was observed after immersion for a week in several neutral and acidic solutions in which ordinary stainless steels unavoidably suffer pitting and crevice corrosion. According to ESCA study, passive film on the amorphous Fe-Cr-P-C alloy consisted mainly of protective chromium oxy-hydroxide and contained some bound water. Electrochemical measurements revealed that more uniform passive film was formed on the amorphous alloy as compared with crystalline alloy having the same composition inasmuch as the amorphous alloy is composed of a homogeneous single phase without crystal defects acting as initiation sites for corrosion. The formation rate of passive film on the amorphous alloy was higher than that on ordinary stainless steels because of high reactivity of amorphous alloy without passive film. Consequently, extremely high corrosion resistance of the amorphous alloys can be interpreted in terms of rapid formation of thick, uniform, highly corrosion resistant passive film.

The Internal Friction and Elastic Modulus of Amorphous Pd-Si and Fe-P-C Alloys

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The internal friction and the shear modulus of the amorphous $\text{Pd}_{80}\text{Si}_{20}$, $\text{Fe}_{80}\text{P}_{13}\text{C}_7$ and $\text{Fe}_{50}\text{Ni}_{33}\text{P}_{12}\text{C}_5$ alloys have been measured at about 0.5 Hz over

a temperature range from room temperature to about 550°C. The internal friction rises steeply with temperature and shows maxima around the crystallization temperature. The activation energy for the steeply rising internal friction has been estimated by the two different procedures; from the shift of the curve by the frequency change and from the slope of the $\ln Q^{-1}$ versus $1/T$ plot. The two values are very different, which indicates the existence of a wide distribution of activation energies. Crystallization of the amorphous alloys resulted in an increase of about 30% in the shear modulus.

The Structure and Crystallization of Amorphous Se

Motonobu KAWARADA and Yuichiro NISHINA

Japan. J. Appl. Phys., **14** (1975), 1519.

The far-infrared transmission spectrum of amorphous selenium has been measured for different temperatures of quenching. The spectrum shows that the weight fraction of Se⁸-ring decreases and that of the polymeric chain increases if the temperature just before quenching, T_{bq} , increases above the melting point of 217°C. The thermal crystallization process of selenium samples with different values of T_{bq} has been studied by differential scanning calorimetry (DSC). The result may be explained by a phenomenological model that the crystallization of amorphous selenium develops from nuclei with the Maxwellian velocity of the crystallization front with the activation energy, $E=0.85\text{eV}$ for $T_{bq}<620^\circ\text{C}$.