Structural Stability and Mechanical Properties of Amorphous Metals

are characterized by a rectangular type loop with the large Barkhausen jumps and low coercive force of about 0.12 Oe. Magnetic domain structure consists of the 180°-domain and the maze-domain. By annealing for 350 mins at 300°C, the coercive force decreases to 0.06 Oe. An additional annealing increases again the coercive force by transformation of the amorphous to the b.c.c. crystalline phase.

New Amorphous Ferromagnets with Low Coercive Force

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Japan. J. Appl. Phys., **14** (1975), 1077.

Soft-ferromagnetic properties have been studied for two amorphous alloy systems of $(Fe_{1-x}Co_x)_{80}P_{13}C_7$ and $(Fe_{1-x}Co_x)_{75}Si_{15}B_{10}$ by means of the X-ray diffraction, thermo-electrical resistance, thermo-magnetization and B-H loop. The B-H loops measured using straight samples were highly rectangular for the as-quenched state. The ratio of the remanence to the saturation magnetization are small ($0.4 \sim 0.6$) for all the alloys. The alloy of $Fe_5Co_{70}Si_{15}B_{10}$ has a very small value of coercive force, 0.01 Oe, and the high value of the maximum permeability, 120,000. The magnetic field annealing has been found to be very effective in improving the low-field magnetic properties. These excellent soft-magnetic properties may be attributed to the zero-magnetostriction and the isotropic nature of the amorphous structure.

Structural Stability and Mechanical Properties of Amorphous Metals

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This is a review of the new information concerned with the structural stability and mechanical properties obtained, for the most part, by research groups at the Tohoku University. The contents consist of eight subjects; 1) atomic structure, 2) effect of temperature on structure, 3) effect of deformation on structure, 4) elastic and anelastic behavior, 5) static strength, 6) deformation, 7) fracture, 8) ductility and toughness, and 9) fatigue properties. From these discussions, it will be concluded that amorphous metals represent a most intriguing group of materials and with further work a new family of materials become available for commercial applications.

Fracture Toughness of Amorphous Metals

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Scripta Met., **9** (1975), 211.

The fracture toughness of some amorphous metals has been measured as functions of the temperature and strain rate by using a tear test of a trouser-leg type. The tearing energy measured by this method and the fracture toughness estimated by Irwin's relation were compared with those of various other materials. These values for amorphous metals are comparable with those for strong steels, and are very high