Compositional Effect on Crystallization of (Fe, Ni, Co)-Si-B Amorphous Alloys

Abstracts of Papers Published in Other Journals

Differential Scanning Calorimetry Study of Fluoride Complexes of Germanium, Tungsten, Uranium, Lithium and Gallium

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Thermochimica Acta, **29** (1979), 147.

The enthalpy and temperature of the sublimation, dissociation and transition of nitrosyl fluoride – germanium, tungsten, uranium, lithium and gallium fluoride adducts were determined from DSC measurements. These adducts were produced using the 80 mole % HF–20 mole % NO_2 solvent.

The following facts were found from the DSC measurements of these adducts. $(NO)_2Li_5F_7$ is converted into LiF through one thermal dissociation step. Three thermal dissociation steps are observed for the reaction of $(NO)_3Ga_2F_9$ to the final form of GaF_3. $NOGeF_5$ sublimates without preceeding reaction, but in the cases of $NOWF_7$ and $NOUF_6$ one and two transitions are observed, respectively, prior to their sublimation.

Compositional Effect on Crystallization of (Fe, Ni, Co)-Si-B Amorphous Alloys

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Nippon Kinzoku Gakkai Shi (J. Jpn. Inst. Met.), **42** (1978), 294.

Compositional effect on the structural changes during heating up to 700°C has been examined with a number of amorphous alloys of X-Si-B and $(X, Y)_{78}Si_{10}B_{12}$ (X, Y: Fe, Ni, Co) by differential scanning calorie and Vickers hardness measurements, transmission electron microscopy and X-ray diffraction analysis.

(1) The amorphous phase of X-Si-B alloys is obtained in the compositional range of 20 to 30 at% metalloid contents. The crystallization temperature of these amorphous alloys is low at low metalloid contents, but it increases with increasing metalloid content. The crystallization process changes in the vicinity of 27～29 at% metalloid contents. Below and above this metalloid content, the amorphous alloys crystallize following the process of Am→Am+MS-I→MS-I+MS-II→Stable. In the lower metalloid contents the MS-I phase is a crystal with the same structure as each mother metal, while in the higher contents it is a compound containing a large amount of metalloid elements. At the intermediate metalloid content (27～29 at%), these MS-I phases do not precipitate, but MS-II phase appears directly from the amorphous matrix and transforms finally to stable phases.

(2) The crystallization process of amorphous $(X, Y)_{78}Si_{10}B_{12}$ alloys proceeds

through two metastable phases (MS-I and MS-II) and finally to stable phases. The crystalline structure of MS-I phase agrees well with that of equilibrium phase at room temperature for the X-Y binary alloys.

Strain Hardening and Recovery in High-Temperature Deformation by Pure-Metal Mode

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Nippon Kinzoku Gakkai Shi (J. Jpn. Inst. Met.), **42** (1978), 432.

By a new method using the stress relaxation test, the coefficient of strain hardening without recovery (h) and the rate of recovery without strain hardening (r) are estimated in high-temperature deformation of fcc aluminum and bcc iron, where the internal stress is confirmed to be nearly 100% of the flow stress. Both h and r are dependent on applied stress σ and temperature T in a steady-state deformation, and are represented by $h=h_0(\sigma/E)^m \exp(-Q_h/RT)$ and $r=r_0\ (\sigma/E)^l \exp(-Q_r/RT)$, where h_0 and r_0 are constants, E is Young's modulus and $m=-0.88(-1.5)$, $l=4.3(3.2)$, $Q_h=-22(-76)$ kJ/mol, $Q_r=88(132)$ kJ/mol for aluminum(iron). During a transient state of tensile deformation in the constant strain-rate test, h and r are nearly independent of strain. The activation energy for recovery (Q_r) is found to be appreciably smaller than that of self-diffusion, and then possible roles of pipe-diffusion and strain-enhanced diffusion in dynamic recovery are discussed.

The Structure of Oxygen-Adsorbed Copper Surfaces Expressed as an "Oxygen Pressure-Temperature Diagram"

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Nippon Kinzoku Gakkai Shi (J. Jpn. Inst. Met.), **42** (1978), 682.

The structure of oxygen-adsorbed copper {100} and {110} surfaces has been studied by low energy electron diffraction (LEED) technique. The surface structure data obtained by the present author and other researchers are summarized in a diagram as a function of surface temperature and oxygen pressure. Attention has been given to unify the notations of the surface structures in order to facilitate comparison of the data. The diagram, called "oxygen pressure-temperature diagram", is a kind of the phase diagram for the surface, indicating the dependence of surface structure on oxygen pressure and heat treatment.

Grain Boundary Fracture of α Brass Bicrystals at an Intermediate Temperature Range

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Nippon Kinzoku Gakkai Shi (J. Jpn. Inst. Met.), **42** (1978), 1096.

Deformation and grain boundary fracture behaviours of α brass bicrystals were examined. The results are summarized as follows:

(1) The temperature dependence of the ductility of α brass bicrystals