Structural Changes in Amorphous Pd_<80>Si_<20> by Neutron Irradiation(Metallurgy)

An Organo-Metallic Polymer Used in Powder Metallurgy: The Effect of Polycarbosilane in Iron-Chromium Alloy

Seishi YAJIMA, Toetsu SHISHIDO, Hideo KAYANO, Yasuhiro HIGASHIGUCHI and Tadaaki AMANO

J. Mater. Sci., **12** (1977), 1834.

A new material was developed by introducing an organo-metallic polymer into powder metallurgy. In the uniform mixture of Fe–13Cr* alloy powder and polycarbosilane (PC) using *n*-hexane, the Fe–13Cr particles were coated with PC. The product of Fe–13Cr+10wt%PC, obtained by hot-pressing the mixture, was subjected to an oxidation test, high-temperature hardness measurement and a wear resistance test, and found to be superior in all respects to that without the PC addition. The structure was observed by transmission electron microscope and it was found that grains of $CrSi_2$ and Cr_7C_3 about 0.1 μm in size, dispersed uniformly in the Fe–13Cr+10%PC, contributed to improvement of the mechanical properties. Observation by scanning electron microscope showed some difference in the formation of the oxidation film between Fe–13Cr and Fe–13Cr+10%PC. This new alloy, while adding an organo-metallic polymer to powder metallurgy, has several outstanding features with the possibility of many applications in the future.

Structural Changes in Amorphous $Pd_{80}Si_{20}$ by Neutron Irradiation

Kenji DOI, Hideo KAYANO and Tsuyoshi MASUMOTO

Appl. Phys. Lett., **31** (1977), 421.

Amorphous $Pd_{80}Si_{20}$ was irradiated with fast neutrons (>1 MeV) to a fluence of 5×10^{20} neutrons/cm^2. X-ray scattering intensities were measured before and after the irradiation with monochromatic Cu-$K\alpha_1$ rays. Scattered intensities for $s>0.4$Å^{-1} ($s=2\sin\theta/\lambda$) proved unaffected, while intensities were found remarkably enhanced for $s<0.4$Å^{-1} after the irradiation, i.e., in the small-angle region and the leading edge of the first halo. The results are discussed in relation to the structural anomalies in amorphous solids.

High-Temperature Oxidation Behavior of Fe-20Cr-4 Al Alloys with Small Additions of Cerium

Tadaaki AMANO, Seishi YAJIMA and Yasutoshi SAITO

Nippon Kinzoku Gakkai Shi (J. Jap. Inst. Met.), **41** (1977), 1074.

The oxidation behavior of Fe-20Cr-4 Al alloys, some containing 0.01, 0.04 and 0.37%Ce, was studied in air at temperatures between 1273 and 1523K by weight-change measurements, X-ray diffraction, electron probe microanalysis and scanning electron microscopy. The surface oxide predominantly formed on all the alloys was α-Al_2O_3. The marker and kinetic studies suggested the α-Al_2O_3 scale grew into the alloys by inward diffusion of oxygen along the oxide grain boundaries. In the alloys without Ce and with 0.01% Ce, the α-Al_2O_3 scale spalled during