LETTER TO THE EDITOR

CONCENTRATION DEPENDENCE OF THE INFLUENCE OF SURFACE INSULATING COATING ON THE MAGNETIC PROPERTIES OF $Fe_{40}Ni_{40}B_{20}$ AMORPHOUS ALLOYS[1])

A. KOŠTURIAK[2]), A. ZENTKO[3]), J. GAJDUŠEK[2]), Košice

ЗАВИСИМОСТ ВЛИЯНИЯ ИЗОЛЯЦИОННОГО ПОВЕРХНОСТНОГО СЛОЯ НА МАГНИТНЫЕ СВОЙСТВА АМОРФНЫХ СПЛАВОВ $Fe_{40}Ni_{40}B_{20}$ ОТ КОНЦЕНТРАЦИИ

It is wellknown that good magnetic properties of commercial magnetic materials are mainly caused by the effect of the surface insulating coating. In connection with the optimization of thickness of the insulating coating for amorphous ferromagnetic alloys the influence of a dilution of the deposition solution on the power loss and initial permeability of $Fe_{40}Ni_{40}B_{20}$ alloys has been investigated.

Insulating surface coatings were prepared on the basis of a phosphate deposition solution [1]. Dilution of the deposition solution was carried out by an amphiprotic solvent. During the deposition procedure the samples (40 mm length) were immersed in a solution and tehen heated at 290 °C for 5 minutes.

The influence of the dilution of the deposition solution on the power loss (measured at $B_m = 0.5$ T, $f = 80$ Hz) and the initial permeability μ_0 are shown in Fig. 1. For comparison the results for two uncoated smples 1 ("as cast" sample) and 1 a (uncoated, annealed at the same temperature as the coated samples) are also shown. It can be seen from the Figure that both the power loss P and the initial permeability μ_0 are sensitive to the concentration of the deposition solution. In the case of the uncoated sample 1 a 7 nm thick surface oxide layer has been found. The presence of such a layer can influence the magnetic properties of metallic ferromagnets [2, 3]. Similarly, in the case of coated samples a transition layer is formed on the surface of the ferromagnetic amorphous ribbon during the deposition procedure, as a result of the chemical reaction of the deposition solution with the surface. The dilution of the deposition solution leads to a change of its reactivity, and therefore, to a change of the physical and chemical properties of the transition layer. In consequence of this change the magnetic properties of the amorphous ferromagnet can be influenced in this way.

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[2]) Dept. of Experimental Physics, P. J. Šafárik University, 040 01 KOŠICE, Czechoslovakia.

[3]) Inst. of Experimental Physics, Slov, Acad. Sci., 040 01 KOŠICE, Czechoslovakia.

The obtained results are the first part of the set of measurements, which should demonstrate the influence of the phosphate insulating coatings on the observed magnetic properties of the amorphous $Fe_{40}Ni_{40}B_{20}$ alloys. More detailed results and the evaluation of this influence will be published later.

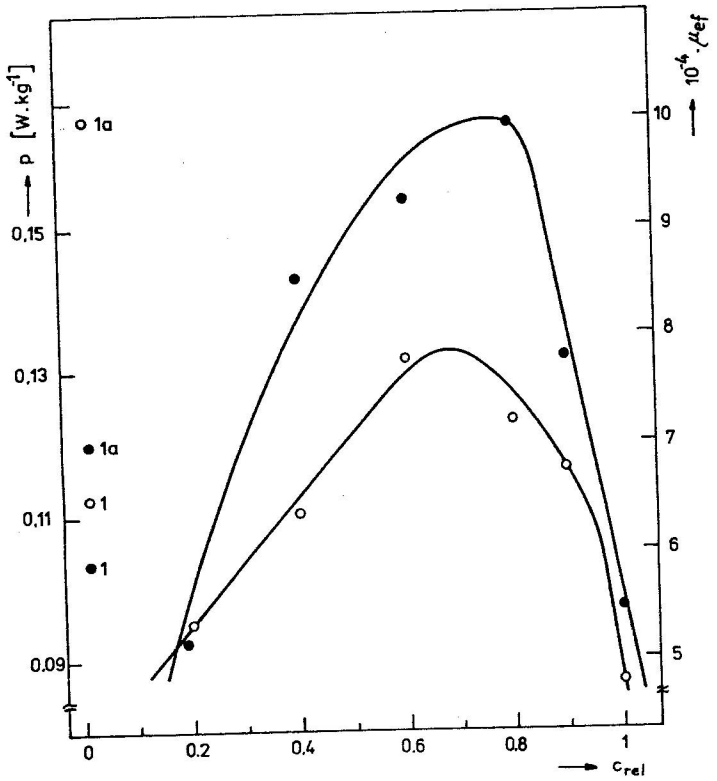

Fig. 1. Concentration dependence of the power loss (closed symbols) and initial permeability (open symbols).

REFERENCES

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