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Autor(en): **Lanotte, L. / Annunziata, A.**

Objekttyp: **Article**

Zeitschrift: **Helvetica Physica Acta**

Band (Jahr): **62 (1989)**

Heft 6-7

PDF erstellt am: **20.09.2024**

Persistenter Link: https://doi.org/10.5169/seals-116107

HIGH QUALITY MAGNETIC STRIPS OF ELECTRODEPOSITED CO-P AMORPHOUS ALLOY

L. Lanotte and A. Annunziata, Dipartimento di Scienze Fisiche , Unità GNSM-CISM, Università di Napoli.

Abstract: $Co_{1-x}P_x$ alloys were produced by electrochemical deposition. By using diluition of the conventional bath, improved amorphous and soft magnetism properties are obtained in opportune conditions.

1. Experimental

Little ribbon-shaped samples were obtained by means of the experimental arrangement shown in figure 1,at a fixed current density σ = 20 A/dm and temperature T= 80 °C, taking 0.5<PH<1. In the following the samples are named A, B or C in agreement with the here listed production bath (A), (B) or (C) respectively: (A) H_2O=0.5 l +H_3PO_3= 20 g +H_3PO_4= 25 g +$CoCl_2 \cdot 6H_2O$= 90 g ;(B) bath (A) + H_2O= 0.25 l; (C) bath (B) + H_2O= 0.25 l. Magnetization curves (fig.1) and susceptivity (fig.2) were measured by fluxometric technique, while X-ray diffraction (fig.3) was gently performed by P.Matteazzi (Ist.Chimica, Ingegneria,Udine,I).

2. Results and Discussion

The bath composition (A) was selectionated on the basis of the previous results [1,2,3] because of it appears appropriate in order to produce samples in crystalline phase but near to the phosphorus atomic fraction sufficient to obtain disordered material (x = 0.11). In effect, the A samples results microcrystalline ones (average grain size 100 Å). The magnetic (fig.2 and 3) and structure properties (fig.4) show that we are close to the condition for producing an amorphous structure. To deposit a non-crystalline alloy , generally it needs to increase the percentage of H_3PO_3 in the solution [1,2] . The results

reported in this short-paper demonstrate that also the decrease of ion concentration can support the deposition of more disordered material. In fact, when the bath (B) and (C) (with increasing diluition) are adopted, figures 2 and 3 show an increase of saturation magnetization M_s and initial susceptivity χ_o, as well as a decrease of saturation field H_s and magnetic anisotropy (area between magnetization curve and the vertical axis). On the same time the X-ray diffraction (fig.4) validate the presence of higher microcrystallinity in the case (B) and amorphous structure in the case (C). We already pointed out [4] that the use of Al substrata facilitates the formation of disordered material or ordered one with a preferential orientation . Now it appears evident the influence of ion concentration on the insurgence of amorphous properties.

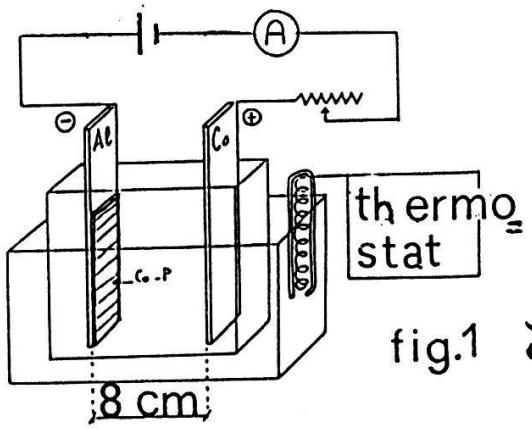

fig.1

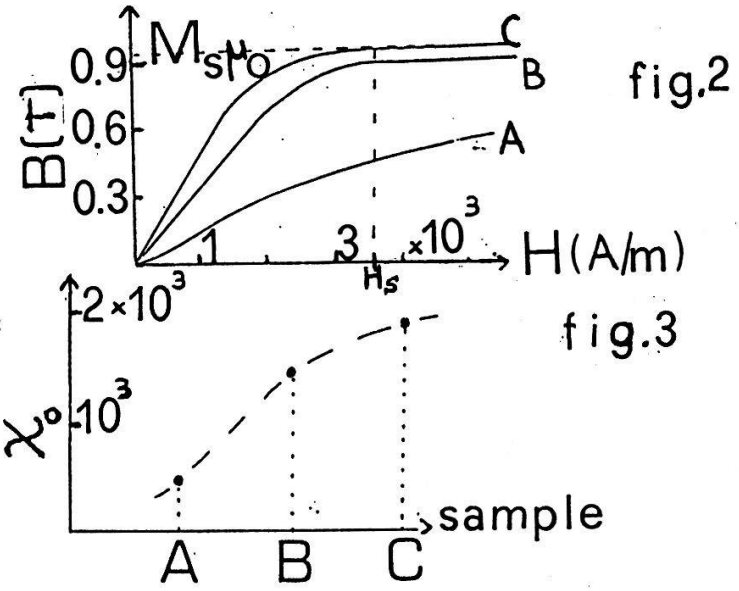

fig.2

fig.3

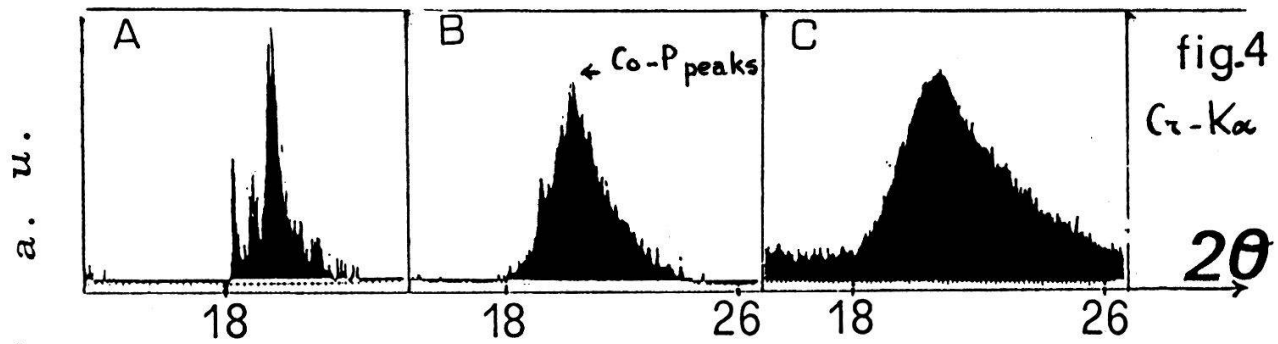

fig.4

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