

**Zeitschrift:** Helvetica Physica Acta

**Band:** 62 (1989)

**Heft:** 6-7

**Artikel:** High quality magnetic strips of electrodeposited Co-P amorphous alloy

**Autor:** Lanotte, L. / Annunziata, A.

**DOI:** <https://doi.org/10.5169/seals-116107>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. [Siehe Rechtliche Hinweise.](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. [Voir Informations légales.](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. [See Legal notice.](#)

**Download PDF:** 21.12.2024

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**

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:  $\text{Co}_{1-x}\text{P}_x$  alloys were produced by electrochemical deposition. By using dilution 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  $\sigma = 20 \text{ A/dm}$  and temperature  $T = 80 \text{ }^\circ\text{C}$ , taking  $0.5 < \text{PH} < 1$ . 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)  $\text{H}_2\text{O} = 0.5 \text{ l} + \text{H}_3\text{PO}_3 = 20 \text{ g} + \text{H}_3\text{PO}_4 = 25 \text{ g} + \text{CoCl}_2 \cdot 6\text{H}_2\text{O} = 90 \text{ g}$ ; (B) bath (A) +  $\text{H}_2\text{O} = 0.25 \text{ l}$ ; (C) bath (B) +  $\text{H}_2\text{O} = 0.25 \text{ l}$ . Magnetization curves (fig.1) and susceptibility (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  $100 \text{ \AA}$ ). 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  $\text{H}_3\text{PO}_3$  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 dilution) are adopted, figures 2 and 3 show an increase of saturation magnetization  $M_s$  and initial susceptibility  $\chi_0$ , 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.

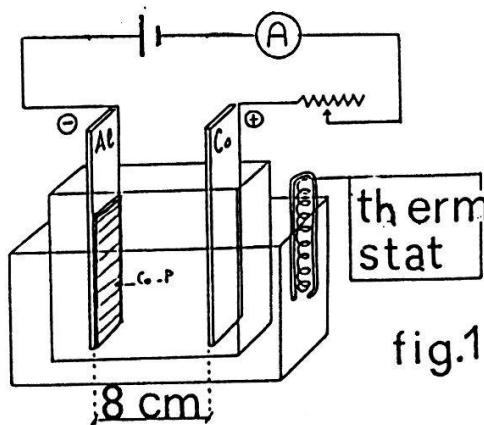


fig.1

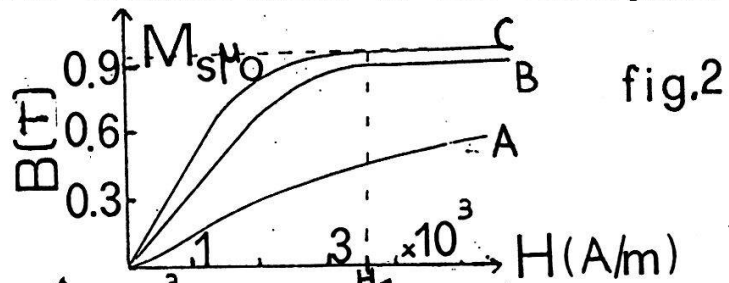


fig.2

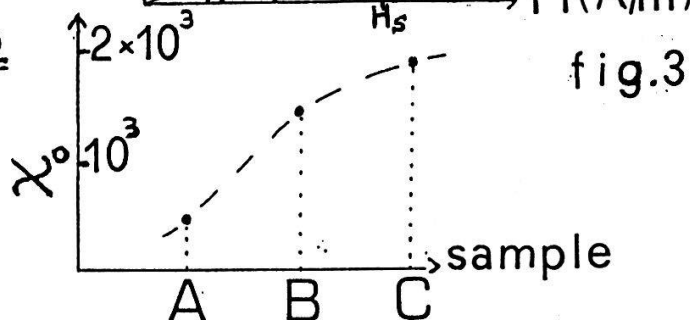


fig.3

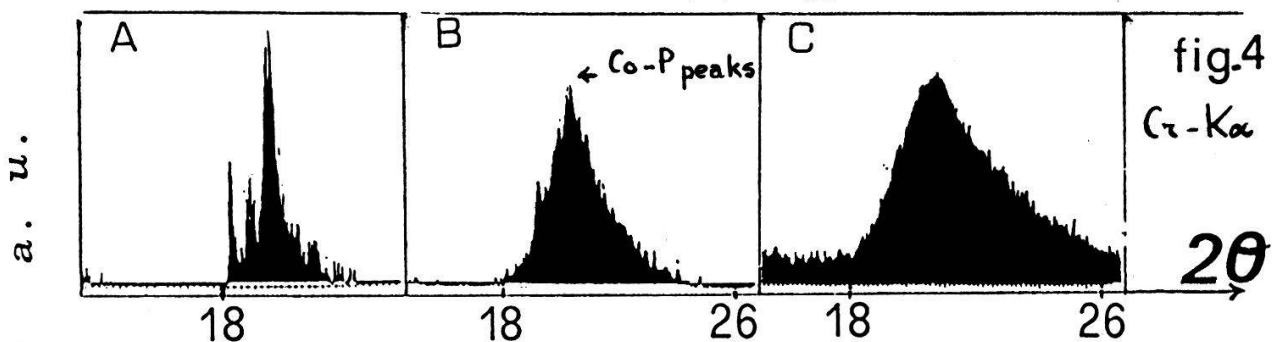


fig.4

Co-K $\alpha$

2 $\theta$

[1] A.Brenner, Electrodeposition, Ac.Press, vol.II, chap.35 (1963).  
 [2] K.Huller et al., J. Magn. Magn. Mat. 53, 269 (1985).  
 [3] L.Lanotte and F.Porra, in "Magnetic Properties of Amorphous Metals", A.Hernando et al. Ed., Elsevier Science Publ., 129 (1987).  
 [4] L.Lanotte et al., Mat.Sciece and Tech., in press