3.3 Tratamento da superfície do eléctrodo

Admitindo que a fraca aderência dos electrodepósitos de sulfuretos de ferro pode dever-se à preparação da superfície da Ebonex®, modificações no tratamento do substrato, foram introduzidas nomeadamente, ataque químico da superfície com $H_2SO_{4(conc.)}$; tratamento electroquímico da superfície, através de multiciclos entre 0.0 e -1.1 V *vs.* ESC; aumento da rugosidade da superfície e aumento da rugosidade da superfície seguida por ataque químico com $H_2SO_{4(conc.)}$. A eficácia dos diferentes métodos foi averiguada recorrendo às técnicas de redissolução oxidativa e microscopia electrónica de varrimento.

A aplicação da primeira técnica permitiu concluir que o aumento da rugosidade é o método mais eficaz para melhorar a aderência dos filmes, o que foi confirmado pelos estudos por microscopia electrónica de varrimento. Na fig. 3 apresenta-se uma micrografia onde é possível observar a superfície do electrodo, totalmente coberta.

A partir dos resultados obtidos neste trabalho é possível concluir que o factor de rugosidade da superfície da Ebonex®, é um parâmetro crítico na aderência dos electrodepósitos de sulfuretos de ferro.

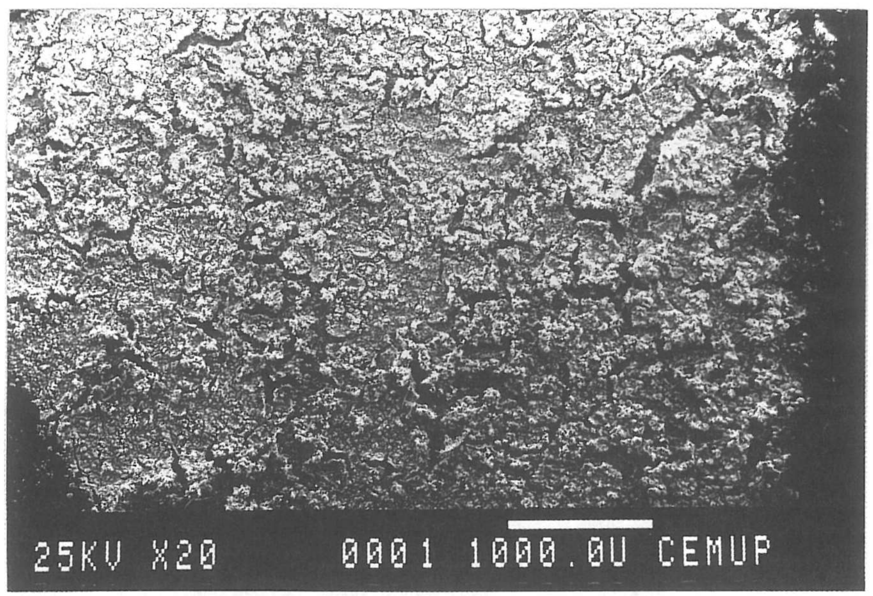

Fig. 3 - Micrografia da superfície da Ebonex®,coberta por um filme de sulfuretos de ferro .

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ELECTRODEPOSITION OF COPPER ON ZAMAK

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Abstract

The present work is a study on the electrodeposition of Copper on Zamak 5 from alkaline copper solution. The effects of time and current density on thick and cathodic current eficiency have been studied by gravimetric methods.

Introduction

Electrodeposition of metal coatings for decoration and/or corrosion protection continiued as an essential segment of metal finishing and kept pace with needs[1].

In this way economic materials have been utilized for susbtrate. These materials are very reagents, therefore there are many troubles in the process of electrodeposition. One of these materials is Zamak, alloy with 94% Zn, 4% Al,1% Cu as well as Mg, Pb, Fe, Sn and Cd.

The requirements of consumers force to improve the quality of metal finishing.

Experimental

Electrodeposition was studied using a Zamak ring of 2 cm^2 area as working electrode. The susbtrate was prepared acording to following industrial methods[2]:

a) Direct electrocleaning for 2 minutes in a 6% detergent solution.

b) Reverse electrocleaning for 10 s in a 6% detergent solution.

c) Washing with distileid water.

d) Acid dipping in 1% H_2SO_4 solution until bubbling.

e) Washing with distileid water.

As counterelectrode was utilized a copper sheet of 8 cm2 area and as reference electrode one of Hg/HgO (Tacussel). All experiments were performed in a one compartment electrochemical cell. The reagents are from Enthone-OMI. The water was prepared with a distiller RO 4 water purification system. The study of temperature was realized with a Hubber Ministat bath. Thick and current eficiency were determined by weight with a 10^{-7} precision Sartorius Ultramicrobalance.

Results and Discusions

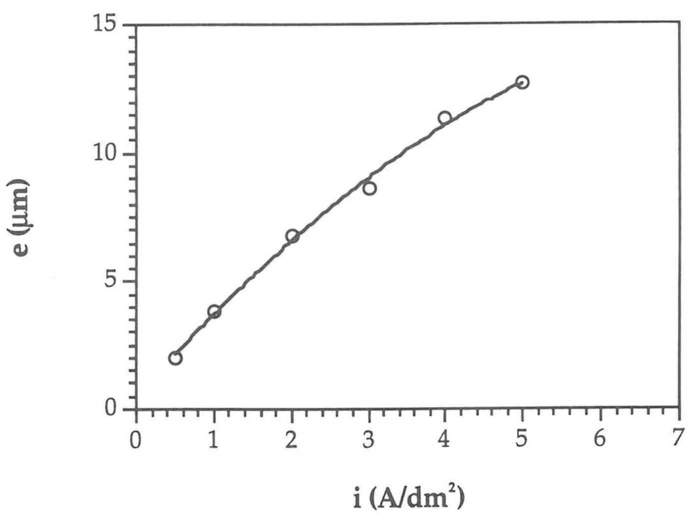

FIG. 1: Dependence of the current density on the thick of the copper deposit. The experiments were performed in the following solution and conditions: 5 g/l KOH, 30 g/l KCN, 175 g/l Sales Cupralite, 45 g/l Cupralite 150, 5 ml /l Cupralite 150 brightener y 5 ml/l, Cupralite 150 Surfactant, Temperature 23°C and t = 15 min.

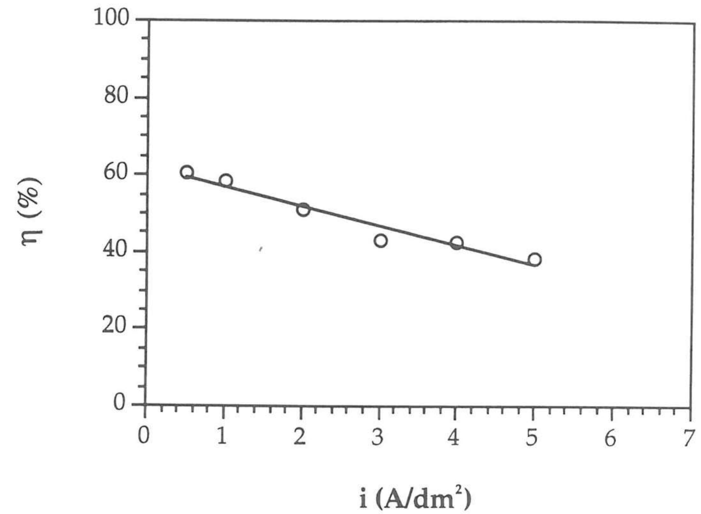

FIG. 2: Dependence of the current density on the cathodic current eficiency. The electrolyte composition and the conditions the same as in Figure 1.

The figure 1 shows the influence of the current density on the thick of Copper deposition on Zamak ring. A higher thick was obtained to apply an increase of the current density. The non-lineal relationship is due to difusion troubles of Copper in the solution[3].

However, the cathodic current eficiency decreases with the current density, as is shown in figure 2. This behaviour is related to the evolution of Hydrogen[4].

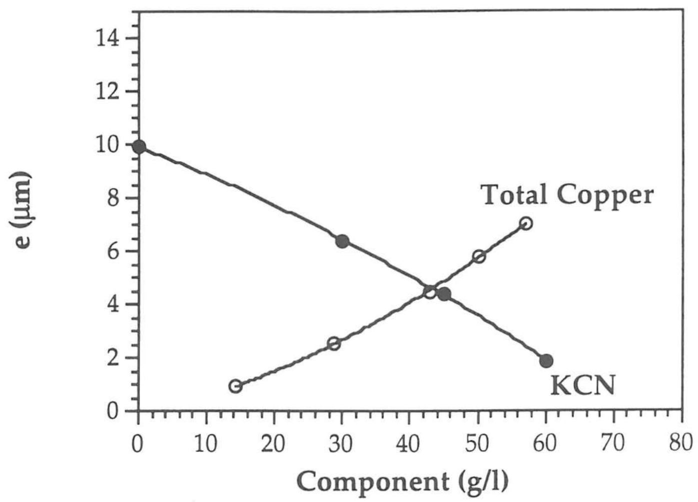

FIG. 3: Dependence of the total Copper and KCN on the thick of Copper deposit. The electrolyte composition the same as in figure 1. And the conditions are i = 2 A/dm^2, Temperature 23°C and t = 15 min.

The influence of the formation component on the thick was studied at constant current density, as it is shown in figure 3. While the Copper favours the deposition of Copper, the KCN decrease the thick of Copper on Zamak.

When the figure 3 is made with the ratio Cu/KCN the result is that an only thick is obtained with the same ratio Cu/KCN.

Acknowledgments

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