

## ELECTROCHEMICAL DEPOSITION OF COBALT ONTO SINGLE AND POLYCRYSTALLINE GOLD ELECTRODES.

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Electrochemical deposition of Cobalt onto different gold substrates, poly and single crystal, from an aqueous solution  $10^{-2}$ M of  $\text{CoCl}_2$ , and 1M  $\text{NH}_4\text{Cl}$  with pH 9.5 (adjusted with NaOH) at  $25^\circ\text{C}$  was studied using the potentiostatic technique and cyclic voltametry. In these conditions the predominant chemical species of Co(II) is the complex  $\text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{1+}$ . During the Co(II) reduction onto the gold surface electrode, both UPD and OPD processes were observed. The UPD process involves an instantaneous nucleation phenomenon with 2D growth diffusion controlled, the stripping of this adlayer also shown evidence of this kind of 2D nucleation process. At the experimental conditions, the cobalt OPD process occurs with a 2D-3D nucleation transition. The associated  $j$ - $t$  curves were satisfactorily fitted with the equation  $j(t) = J_{DL}(t) + J_{2D-dc}(t) + j_{3d-dc}(t)$ , propose in this work, where  $J_{DL}(t)$  is the contribution due to the double layer charge process<sup>2</sup>,  $J_{2D-dc}(t)$  correspond to the temporal evolution of the current density, theoretically described by Armstrong et al<sup>3</sup>. for an instantaneous nucleation with 2D growth diffusion controlled and  $J_{3D-dc}(t)$  is the current density related with a 3D nucleation process limited by the mass transfer reaction according with the theoretical description recently given by Hermann and Tarallo<sup>4</sup>. The influence of the substrate on the cobalt nucleation process is also discussed.

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