Preparation of Platinum Particles Dispersed into 3-N-Propylpyridinic-Silsesquioxane

V. dos Santos[1], C. G. de Jesus[1], S. T. Fujiwara[2], V. Zucolotto[3], J. R. Garcia[1], C. A. Pessoa[1] and K. Wonrath[1]

[1]*Universidade Estadual de Ponta Grossa, Ponta Grossa, PR, Brazil*
[2]*Universidade Estadual do Centro Oeste, Guarapuava, PR, Brazil*
[3]*IFSC, Universidade de São Paulo, São Carlos, SP, Brazil*

In the last years hybrids composites consisting of organic/inorganic matrix and dispersed metallic particle have been exhaustively studied aim to improve electronic, optical and electrocatalitic properties of this class of materials. In this context the objective of this work concerns the preparation of platinum particles dispersed into the cavity of the inorganic polyelectrolyte 3-N-propyl-pyridinic-silsesquioxane chloride ($SiPy^+Cl^-$) and to produce layer-by-layers (LbL) films using this hybrid material alternated with poly-vinylsulfonic acid (*PVS*). The hybrid material was prepared using a mixture of 2.0 mL of 1.00 mmol L^{-1} H_2PtCl_6 and 2.0 mL of 0.07 mmol L^{-1} $SiPy^+Cl^-$. Into this mixture (under agitation) 2.0 mL of 0.07 mmol L^{-1} of formic acid was added and the system was held under agitation for 4 h. The LbL films was obtained using the as prepared hybrid solution and a PVS sotution with 0.5 g L^{-1} deposited onto ITO substrate. The hybrid synthetic process was followed by UV-vis spectroscopy and the electrochemical behaviour of hybrid/PVS LbL films (with a different numbers of bilayers) was investigated in a H_2SO_4/Methanol solution. Before acid formic addition the UV-vis spectrum of the synthetic mixture showed a band centered at 375 nm (assigned to $PtCl_6^{2-}$ ion), after the acid formic addition this band gradually disapears indicanting an effective platinum reduction. The voltammetric profile of the LbL films in an acidic methanol solution was characteristic for the platinum behaviour showed that the metallic particle was formed and incorpored onto the substrate.

Keywords: Disperse Pt particles, Polyelectrolyte, LBL films, interfaces, Electrocatalysis

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vagner_quimica@hotmail.com – Av. Carlos Cavalcanti, 4748, Uvaranas – 84030-900, Ponta Grossa – PR – Brazil.