



Electrodeposition of Au Nanoparticles within Multilayered Films

Iost⁽¹⁾, Rodrigo M., Crespilho⁽⁴⁾, Frank Nelson, Oliveira Junior⁽³⁾, Osvaldo N., Zucolotto⁽²⁾, Valtencir

(1) *Instituto de Física de São Carlos, IFSC, USP (SP), rodrigoioist@yahoo.com.br*

(2) *Instituto de Física de São Carlos, IFSC, USP (SP), zuco@ifsc.usp.br*

(3) *Instituto de Física de São Carlos, IFSC, USP (SP), chu@ifsc.usp.br*

(4) *Centro de Ciências Naturais e Humanas, CCNH, UFABC (SP), frank.crespilho@ufabc.edu.br*

Abstract – Fabrication of nanoparticles by electro-synthesis is advantageous due to the fine control that may be achieved on charge and redox process, quantity and the morphology of the synthesized material. In this study we describe a new strategy to prepare an electrochemical device based on Au nanoparticles (AuNP) electrochemically deposited on polyelectrolyte multilayer films.

Fabrication of nanoparticles by electro-synthesis is advantageous due to the fine control that may be achieved on charge and redox process, quantity and the morphology of the synthesized material. In this study we describe a new strategy to prepare an electrochemical device based on Au nanoparticles (AuNP) electrochemically deposited on polyelectrolyte multilayer films. First, poly(styrene sulfonate) and polyamidoamine dendrimer (PAMAM) were assembled onto indium tin oxide-covered glass substrate (ITO) by using layer-by-layer (LbL) technique. Chloroaurate ions were further adsorbed and reduced to Au⁰ by using chronoamperometry, where the stationary current is reached at 1.5 seconds in H₂SO₄ 0.5 mmol L⁻¹. The presence of AuNP within the ITO-(PSS/PAMAM)₃/AuNP electrodes were verified by cyclic voltammetry. The results suggested that AuNP are strongly adsorbed on the film surface and seemed to be encapsulated inside the PAMAM. Microscopic and spectroscopic techniques had also been employed to evaluate the mechanism of AuNP formation.

References

[1] Crespilho, F. N. ; Ghica, M. E. ; Florescu, M.; Nart, F. C. ; Oliveira Jr., O. N.; Brett, C.M. A. A *Electrochemistry Communications*, 8, p. 1665-1670, 2006.

[2] Alencar, W. S.; Crespilho, F. N.; Zucolotto, V.; Oliveira Jr., O. N.; Silva, W. C. *Journal of Physical Chemistry C*, v. 111, p. 12817-12821, 2007.