

3-*n*-propyl-1-azonia-4-azabicyclo[2.2.2]octane silsesquioxane chloride:

Simultaneous voltammetric determination of ascorbic acid, dopamine and uric acid

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Abstract – In this work, 3-*n*-propyl-1-azonia-4-azabicyclo[2.2.2]octane silsesquioxane chloride was synthesized by the sol-gel process and adsorbed on alumina coated silica, SAl/SiDb⁺Cl⁻, as represented in Figure 1. A modified electrode was prepared by mixing SAl/SiDb⁺Cl⁻ with graphite, pressed it as pellets and glued to a glass tube, using a copper wire for the electrical contact. The electrochemical performance of the electrode was tested by using differential pulse voltammetry (DPV) technique with three important biomolecules: ascorbic acid (AA), dopamine (DA) and uric acid (UA).

Organic functionalization of mesoporous silica is an attractive area of research in constant growth due to its many and varied technological applications in the field of catalysis, ion exchange, optical and electronic devices. 3-*n*-propyl-1-azonia-4-azabicyclo[2.2.2]octane silsesquioxane chloride was prepared according to a procedure described in the literature [1] and the structure of the synthesized xerogel was confirmed by solid-state ¹³C NMR and infrared spectroscopy. Aluminum isopropoxide was employed to coat silica (Aldrich, S_{BET} = 500 m² g⁻¹), providing reactive Al-OH functional groups on the surface to attach the silsesquioxane polymer.

It is known that simultaneous electrooxidation of AA, DA and UA is not possible at bare carbon electrodes, where only a broad anodic peak is observed due the potential peaks proximity. However, SAl/SiDb⁺Cl⁻ modified electrode showed three oxidation peaks at -79 mV, 131 mV and 281 mV, *versus* SCE, corresponding to the oxidation of AA, DA and UA, respectively, in Britton-Robinson buffer solution, pH = 7.04, Figure 2.

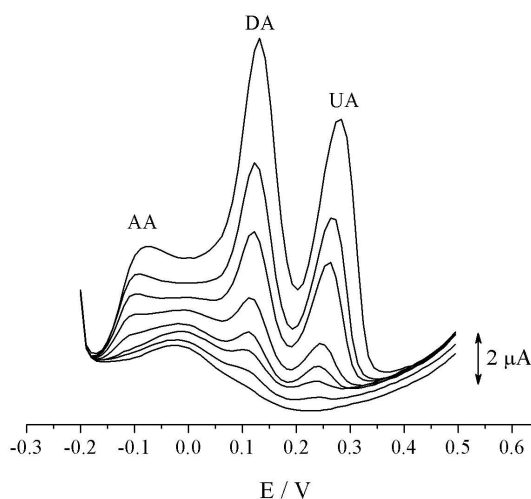
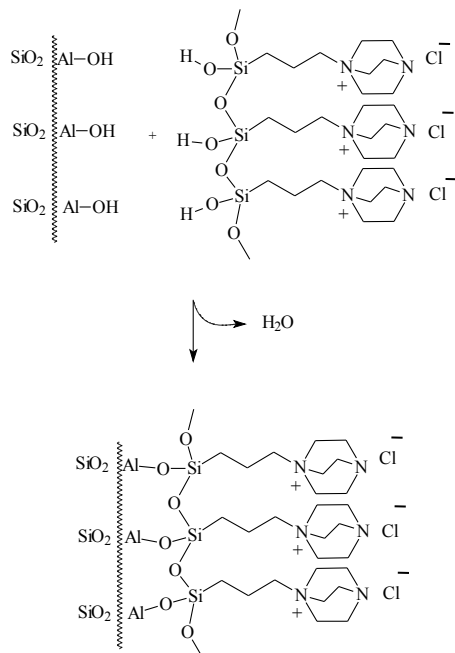


Figure 1: Adsorption of 3-*n*-propyl-1-azonia-4-azabicyclo[2.2.2]octane silsesquioxane chloride on alumina coated silica.

Figure 2: Differential pulse voltammograms recorded at SAl/SiDb⁺Cl⁻ modified electrode of different concentrations of AA, DA and UA

References

[1] A. R. Ramos, J. Arguello, H. A. Magosso, Y. Gushikem, J. Braz. Chem. Soc. 19 (2008) 755-761.