J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C1-092

Adlayer sulfur on Au(111) from piperazine bis(dithiocarbamate) sodium salt ethanol solution

Mayra P Hernandez-Sanchez[1], Javier A Martinez[1], Gema Navarro-Marin[1], Mario H Farias-Sanchez[2], Eduardo Martinez[3], David Diaz[2] and **J C Zuaznabar[4]**
[1]Institute of Materials Science and Technology, Cuba
[2]Centro de Nanociencias y Nanotecnología de la UNAM, Mexico
[3]CIMAV-Monterrey, Mexico
[4]Universitat Rovira i Virgili, Spain

The formation of sulfur atomic layers on Au(111) from ethanol solutions of piperazine bis(dithiocarbamate) sodium salt is described. The deposition of S was investigated using scanning tunneling microscopy (STM) and cyclic voltammetry (CV) studies including the analyses of the X-ray photoelectron spectroscopy (XPS), UV photoelectron spectroscopy (UPS) and absorption of the X-ray. The Au(111) substrate was immersed in the Na_2DTC_2pz ethanol solution during 24 hours (high coverage) and 14 hours (low coverage). Finally the substrates were removed from solutions and consecutively rinsed and dried. The adsorption of the sulfur on Au(111) is produced by the decomposition of the piperazine bis(dithiocarbamate). Cyclic Voltammetry allow the coverage of the sulfur layer. At coverages, STM micrographics revealed the quasi-square patterns formed by eight sulfur atoms (octomers), previously observed by a number of workers, which indicated the decomposition of the molecule leading to the adsorption of sulfur and ejection of the other groups. At low coverage, high resolution STM micrographics showed hexagonal arrangement. The XPS used photon energies of 1486.6 and 300 eV, respectively, for the survey scan and high-resolution Au(4f) and S(2p) energy windows. UPS were used to measure the valence band region with photon energy of 21.2 eV. XANES measurements at the S L-edge using synchrotron radiation provided information, which allows describing the energy band. The combination of the XPS, UPS and XANES allowed us to reveal the characteristics in the energy band showing that the octomers are capable of altering the Au electronic states at the same level as atomic sulfur adsorbed at low coverage.

mayrap@imre.uh.cu