Int. J. Electrochem. Sci., 12 **(2017)** 1075 – 1093

International Journal of
ELECTROCHEMICAL
SCIENCE
www.electrochemsci.org

Alloy Formation by Electrodeposition of Niobium and Aluminium on Gold from Chloroaluminate Melts

Nataša M. Vukićević[1], *Vesna S. Cvetković*[1,*], *Ljiljana S. Jovanović*[2], *Sanja I. Stevanović*[1], *Jovan N. Jovićević*[1]

[1] Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Njegoševa 12, 11000 Belgrade, Serbia, PAK 125213
[2] Faculty of Scences, University of Novi Sad, Trg D. Obradovića 3, 21000 N. Sad, Serbia.
[*]E-mail: v.cvetkovic@ihtm.bg.ac.rs.

doi: 10.20964/2017.02.34

Received: 3 October 2016 / *Accepted:* 8 December 2016 / *Published:* 30 December 2016

Niobium and aluminium have been electrodeposited from inorganic chloroaluminate melts onto gold substrate at 473 K. The melts were prepared from an equimolar mixture of $AlCl_3$+NaCl with niobium added by anodic dissolution. It was found that aluminium and niobium underpotential deposition on gold precedes overpotential deposition of niobium and subsequent aluminium deposition. Niobium was overpotentially deposited individually and co-deposited with aluminium. Applied electrochemical techniques (linear sweep voltammetry, polarization, open circuit and potential step) indicated, then physical analytical methods (scanning electron microscopy, energy dispersive spectrometry, atomic force microscopy and X-ray diffraction) confirmed formation of several niobium-aluminium, niobium-gold and aluminium-gold alloys in niobium and aluminium underpotential as well as in niobium and aluminium overpotential regions.

Keywords: Niobium, Aluminium, Gold, Metal deposition, Alloy formation, Chloroaluminate melt

FULL TEXT