Accepted Manuscript

Electrodeposition of Well-Defined Gold Nanowires with Uniform Ends for developing 3D nanoelectrode ensembles with enhanced sensitivity

Y.Bahari Mollmahale, M. Ghorbani, A. Dolati, D. Hosseini

PII:	S0254-0584(18)30266-9
DOI:	10.1016/j.matchemphys.2018.04.004
Reference:	MAC 20499
To appear in:	Materials Chemistry and Physics
Received Date:	12 November 2016
Revised Date:	24 March 2018
Accepted Date:	01 April 2018



Please cite this article as: Y.Bahari Mollmahale, M. Ghorbani, A. Dolati, D. Hosseini, Electrodeposition of Well-Defined Gold Nanowires with Uniform Ends for developing 3D nanoelectrode ensembles with enhanced sensitivity, *Materials Chemistry and Physics* (2018), doi: 10.1016/j.matchemphys.2018.04.004

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Electrodeposition of Well-Defined Gold Nanowires with Uniform Ends for developing

3D nanoelectrode ensembles with enhanced sensitivity

Y. Bahari Mollmahale^{a*}, M. Ghorbani^b, A. Dolati^b and D. Hosseini^c

^a Nanotechnology Department, University of Guilan, Rasht, Guilan, Iran

^b Department of Materials Science and Engineering, Sharif University of Technology, Tehran, Iran

^c Department of Mechanical and Process Engineering, ETH Zurich, Switzerland

Abstract

Fabrication of well-defined gold nanowires (GNWs) is of significant importance in many fields such as sensing applications. In this study, the electrodeposition of well-defined GNWs inside polycarbonate (PC) template has been discussed in detail. GNWs were potentiostatically electrodeposited at different filling rates. The growth of GNWs at different stages of pore filling was monitored by electrochemical measurements and field-emission scanning electron microscopy (FE-SEM). It was confirmed that under growth rates between 2.5 to 4 nm/s, GNWs with smooth ends grew uniformly inside the template without any imperfections or corrugations. The length of GNWs was electrochemically controlled to be as same as the template thickness (6 μ m) for sensing aims. Ensembles of three dimensional gold nanoelectrodes (3D GNEs) were then developed by partial etching of the PC template, thus making a brush-like structure out of GNWs. The sensitivity of the 3D GNEs was investigated in the presence of [Fe(CN)₆]^{4/3-} redox couple. The results indicated that the response of the prepared 3D GNEs effectively improved as the number of etching cycles increased. The introduced 3D GNEs show promising results for the future sensing applications.

Download English Version:

https://daneshyari.com/en/article/7921474

Download Persian Version:

https://daneshyari.com/article/7921474

Daneshyari.com