Synthesis and Application of MWCNT-SPIMP as a Suitable Neutral Carrier for Construction of New Copper Selective Carbon Paste Electrode

Mina Behfar1*, Mehrorang Ghaedi2, Rezvan Behfar3

1Young Researchers and Elite Club, Gachsaran Branch, Islamic Azad University, Gachsaran, Iran
2Department of Chemistry, University of Yasouj, Yasouj 75914-353, Iran
3Department of Chemical Engineering, University of Arak, Arak, Iran
*E-mail: Mina_Behfar_65@yahoo.com

doi: 10.20964/2016.07.32

Received: 13 July 2015 / Accepted: 7 December 2015 / Published: 4 June 2016

In this research Multi-walled carbon nanotube (MWCNT) surface was modified chemically by a couple of reactions between trimethoxysilyl-propyl-amine (TMSPA) and (2)-hydroxybenzaldehyde (2-HBA) which is then characterized by FT-IR technique. This new material (MWCNT-SPIMP) in carbon paste electrode, matrices selectively the Cu$^{2+}$ ion. The influence of variables including sodium tetraphenylborate ((C$_6$H$_5$)$_4$BNa), some amount of MWCNT-TMSPA, Nujol and graphite powder on electrode response has been investigated and their value was set as graphite powder: NaTPB: Nujol: carrier in the mass (mg) ratio of 150/6.0/30.0/50 for this electrode. At the optimum it was set as the proposed ion selective electrode response, and is linear over the wide range concentration of $1.0 \times 10^{-8}$ to $1.0 \times 10^{-2}$ mol L$^{-1}$ with slopes of 30.01 per decade of ion concentration and detection limit of $8.8 \times 10^{-9}$ mol L$^{-1}$. The response of this electrode is independent of pH in the range of 3.0-6.0 with a short response time of about 5s. This electrode successfully has been applied for potentiometric determination of Cu$^{2+}$ ion content in various real samples and as indicator electrodes for potentiometric titration.

Keywords: Cu$^{2+}$-selective electrode, Potentiometric sensor, Carbon paste electrode, Multiwalled Carbon Nanotubes.

FULL TEXT

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/4.0/).