One-step synthesis of Ag nanoparticles decorated graphene for application in electrochemical detection of Pb²⁺ and Cd²⁺ ions

Yongfeng Liu^{1,2,*}, Jiangtao Zhang^{1,2}, Xiaojun Du², Yang Cao², Youyi Sun^{2,*}

¹Department of Electronic and Communication Engineering, Shanxi Polytechnic College, Taiyuan, Shanxi Province. 030006, China.

²School of Material Science and Engineering, North University of China, Taiyuan, Shanxi Province. 030051, China.

*E-mail: zslxzlyf@tom.com (YF. Liu), syyi@pku.edu.cn (YY. Sun).

doi: 10.20964/2021.05.45

Received: 18 January 2021 / Accepted: 8 March 2021 / Published: 31 March 2021

Here, the Ag nanoparticles decorated graphene (AgNP@GNs) were fabricated by combining liquid phase exfoliation with in-situ solvent reduction method. Furthermore, the electrochemical sensitivity toward Cd²⁺ and Pb²⁺ ions was also investigated in detail. This AgNP@GNs presented the excellent electrical properties ($2.5 \times 10^4 \text{ S/m}$), meanwhile showed high electrochemical detection ability toward Cd²⁺ and Pb²⁺. The sensitivity of AgNP@GNs toward Pb²⁺ and Cd²⁺ was ca. $15.2 \mu\text{A}/\mu\text{M}$ (or $1246.4 \mu\text{A}/\mu\text{g L}^{-1}$) and $0.09 \mu\text{A}/\mu\text{M}$ ($4.32 \mu\text{A}/\mu\text{g L}^{-1}$), respectively. The AgNP@GNs was also evaluated to electrochemical detection of Cd²⁺ and Pb²⁺ in real water, in which the recoveries (96~124%) were obtained. The work does not only provide a facile method to synthesize AgNP@GNs with good dispersion, but also showed good electrical properties for various applications.

Keywords: One-step, Synthesis, Graphene, Ag nanoparticles, Electrochemical detection.

[FULL TEXT](#)

© 2021 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/>).