Functionalization of Multiwalled Carbon Nanotubes using Cold Plasma Treatment and their Electrochemical Performances

L. L. Guo¹, Z.H. Luo^{1,*}, Y.Z. Zhao¹, J. Guo¹, M. Zhu¹, K. Luo^{1,*}, A. Z. Huang²

¹ Guangxi Key Laboratory of Universities for Clean Metallurgy Comprehensive Utilization of Nonferrous Metal Resource, Guilin University of Technology, Guilin, 541004, PR China

² Humanwell Healthcare (GROUP)CO., LTD, Wuhan, 430075, PR China

*E-mail: luozhihong615@glut.edu.cn, luokun@glut.edu.cn

doi: 10.20964/2019.12.55

Received: 7 August 2019 / Accepted: 17 September 2019 / Published: 29 October 2019

Functionalization of multiwalled carbon nanotubes (MWNTs) are proceeded with cold plasma generated in N₂ and air atmosphere. X-ray photoelectron spectroscopy (XPS) shows that the nitrogen and/or oxygen elements are incorporated into MWNTs. The total nitrogen contents are approximately equal in N₂ and air atmospheres, while oxygen content is increased significantly in air atmosphere, the species and content of the functional groups depend on the applied gases. Transmission electron microscope (TEM) shows that the morphology of functionalized MWNTs is almost the same to pristine MWNTs, although functional groups and defects increase. The electrochemical experiments results demonstrate that introduction of functional groups enhance the pseudocapacitance, while the cyclic stability of the functionalized MWNTs is as well as the pristine MWNTs.

Keywords: Cold plasma, Multiwalled carbon nanotubes, Functionalization, Supercapacitor

[FULL TEXT](#)

© 2019 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/>).