Fabrication of Flexible PVA/Polyaniline/WS₂ Composite Film and Its High Capacitance Behaviors

Aiqin Liang^{1, #}, Danhua Zhu^{1, #}, Liming Xu¹, Weiqiang Zhou^{1, *}, Jingkun Xu^{1, *}, Xuemin Duan²

¹ Jiangxi Engineering Laboratory of Waterborne Coatings, Jiangxi Science and Technology Normal University, Nanchang 330013, People's Republic of China

² School of Pharmacy, Jiangxi Science and Technology Normal University, Nanchang 330013, People's Republic of China

*E-mail: zhouwqh@163.com, xujingkun@tsinghua.org.cn.

doi: 10.20964/2020.10.32

Received: 26 September 2019 / Accepted: 5 July 2020 / Published: 31 August 2020

A flexible ternary composite film based on polyvinyl alcohol (PVA), polyaniline (PANI) and WS₂ was prepared *via* the electropolymerization of the prefabricated PVA/aniline/WS₂ hydrogel. As-prepared PVA/PANI/WS₂ composite film was characterized by scanning electron microscopy, X-ray photoelectron spectroscopy, energy dispersive X-ray spectrometry, and electrochemical technologies. The PVA/PANI/WS₂ film had a specific capacitance of 2437 mF cm⁻² at 2 mV s⁻¹ in H₂SO₄ solution (1.0 M). After 5000 cycles, the capacitance retention reached 70% of initial specific capacitance. The high electrochemical behavior of composite film was mainly attributed to the ionic conductivity of PVA and the integration of pseudocapacitance of PANI and WS₂. This flexible PVA/PANI/WS₂ film provided a potential application in flexible supercapacitor.

Keywords: Flexible films, WS₂ nanosheets, Polyaniline, Supercapacitors

[FULL TEXT](#)

© 2020 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/>).