Preparation of PVA-KOH-Halloysite Nanotube Alkaline Solid Polymer Electrolyte and its Application in Ni-MH Battery

Lidan Fan², Juan Chen¹, Gang Qin^{2,*}, Libo Wang¹, Xiaoyi Hu¹, Zhongshuo Shen¹

¹ School of Civil Engineering, Henan Polytechnic University, Jiaozuo 454001, China

² School of Materials Science and Engineering, Henan Polytechnic University, Jiaozuo 454001, China

*E-mail: qingang@hpu.edu.cn

doi: 10.20964/2017.06.65

Received: 23 January 2017 / Accepted: 14 April 2017 / Published: 12 May 2017

Alkaline solid polymer electrolytes (ASPEs) comprising of poly(vinyl alcohol) (PVA) and KOH with addition of natural halloysites (HNTs) nanotube have been prepared. The ionic conductivity and thermal stability of ASPE were improved by the blending of HNTs. The PVA-KOH-HNTs ASPE with m(PVA): m(KOH)=1.5:1.5 and HNTs=8 wt% exhibited the highest ionic conductivity of $0.071 \text{ S} \cdot \text{cm}^{-1}$ at 30 °C. The microstructures of the PVA-KOH-HNTs ASPEs were measured by FTIR and XRD, and the micro-porous morphology was observed by SEM. The influence of temperature on the ionic conductivity was detected. To investigate the electrochemical properties of the ASPE, a Ni-MH battery with the configuration of hydrogen storage alloy/PVA-KOH-HNTs/Ni(OH)₂ was fabricated. The highest discharge capacity of $223 \text{ mAh} \cdot \text{g}^{-1}$ was obtained.

Keywords: Alkaline polymer electrolyte; Halloysites; Ionic conductivity; Ni-MH battery

[FULL TEXT](#)

© 2017 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/>).