Short Communication

Effect of MXene on Oxygen Ion Conductivity of $\text{Sm}_{0.2}\text{Ce}_{0.8}\text{O}_{1.9}$ as Electrolyte for Low Temperature SOFC

Hongxi Xian^{1,2}, Chanchan Fan¹, Peng Zhang¹, Ranran Wang¹, Chenxi Xu^{1,*}, Hua Zhai^{2,3,*}, Tao Hong¹, Jigui Cheng

¹ School of Materials Science and Engineering, Hefei University of Technology, Hefei, Anhui, China, 230009

² Institute of Industry & Equipment Technology, Hefei University of Technology, Hefei, Anhui, China, 230009

³ Key Lab of Aerospace Structural Parts Forming Technology and Equipment of Anhui Province, Hefei University of Technology, Hefei, China, 230009

*E-mail: xuchenxi31@126.com, jxzhaihuajx@hfut.edu.cn

doi: 10.20964/2019.08.07

Received: 8 April 2019 / Accepted: 17 May 2019 / Published: 30 June 2019

Low temperature solid oxide fuel cell (SOFC) has received great interest recently. However, the low oxygen ion conductivity of electrolyte restricts the operation temperature reduction for SOFC. In this report, 2D nanomaterial $\text{Ti}_3\text{C}_2\text{T}_x$ is used as filler doped into the $\text{Sm}_{0.2}\text{Ce}_{0.8}\text{O}_{1.9}$ (SDC) to enhance the conductivity and mechanical strength of composite electrolyte. The 5wt.% $\text{Ti}_3\text{C}_2\text{T}_x$ /SDC composite membrane exhibits the 3 and 9 times ionic conductivity as that of SDC at 500°C and 600°C, respectively. Furthermore, the peak power density of the single cell enhanced by ~250% at 500°C. The addition of $\text{Ti}_3\text{C}_2\text{T}_x$ -MXene also improved the hardness, fracture toughness and thermal stability of composite membranes.

Keywords: MXene, composite electrolyte, low temperature SOFC, Mechanical Strength

[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/>).