

## عنوان مقاله:

Porous carbon nanosheets derived from ZIF-8 with transitional metal as cathode proton exchange membrane fuel cell

## محل انتشار:

هفدهمین سمینار سالانه الکتروشیمی ایران و دوازدهمین کنفرانس پیل سوختی ایران (سال: 1401)

تعداد صفحات اصل مقاله: 2

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## خلاصه مقاله:

Currently, an increasing world appeal for energy, and the environmental pollution challenges of fossil fuel such as greenhouse gases, global warming and climate change have enforced world scientist community to explore an alternative environmentally friendly renewable energy sources [1]. In recent years, fuel cell which is an energy conversion tool has attracted a considerable attention [2]. Among different types of energy conversion device, hydrogen fueled proton exchange membrane fuel cell (PEMFC), have shown an exceptional characteristics, including low operating temperature ( $< 90^{\circ}\text{C}$ ), easy-to-handle, environmental sustainability and higher efficiency [3]. However, PEMFC has experienced low performance caused by the slow oxygen reduction reaction (ORR) at the cathode, therefore catalyst is needed to improve the sluggish kinetics of ORR process. For many years, a commercial platinum metal catalyst supported by carbon black (Pt/C) has been traditionally used to improve ORR cathode reaction kinetics. Although Pt/C catalyst promoted ORR reaction, higher price and low availability prevented to be used in the large scale PEMFC operation. In the past decade, great efforts have been made in the development of cheaper and abundant non noble catalysts based on nanoporous carbon for ORR enhancement in PEMFC cathode. ORR is a complex reaction with either two or four reaction pathways that involve different mechanisms associated with multiple adsorptions, desorption, dissociation of oxygen. It is widely considered that zeolitic imidazolate frameworks (ZIFs) derived porous nitrogen doped carbon (NC) possess an effective electrocatalytic activity towards the facilitation of oxygen reduction and charge transfer, promoting ORR performance [4]. ZIFs are a subgroup of metal organic frameworks (MOFs), which are mainly prepared from the mixing of organic imidazolate ligand and inorganic metal salt (Zn or Co) in a solvothermal method [5]. In this study, different catalyst support materials pyrolysis temperatures of  $800^{\circ}\text{C}$  were successfully derived from the pyrolysis of pristine ZIF-8, single and double metal doped. The catalyst supports were physically characterized by XRD, SEM/ED-S, elemental analysis, and Raman spectra. The prepared catalyst support materials were loaded and their ORR electrocatalyst properties were studied with polarization curves. The high specific area, porous structure, and abundant catalytic Co, Mn, and N species gave rise to the ORR performance of the catalyst. As a result, the as-prepared CoNC, Mn-NC, and Co-MnNC catalysts showed an onset potential of ... 0.72, 0.79, and 0.89 V in

## کلمات کلیدی:

Oxygen reduction reaction, Precious-metal-free catalyst, PEMFCs

