Electrochemical Properties of SPEEK/Epoxy/ Graphene Oxide Composites as Proton Exchange Membrane

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doi: 10.20964/2018.03.03

Received: 25 September 2017 / Accepted: 13 November 2017 / Published: 5 February 2018

The DS 68% SPEEK composite membranes were prepared by post-sulfonation. Using diethylenetriamine as the epoxy cross-linking agent, which is uniformly distributed in the grafted SPEEK to form SPEEK/epoxy semi-interpenetrating network structure and explore the semi-interpenetrating network on the impact of membrane performances. Graphene oxide was synthesized according to Hummers method and organic in γ -chloropropyl triethoxysilane. Sulfonated graphite oxide doped SPEEK were prepared and optimized the formulation. Finally a series of SPEEK/epoxy/graphene oxide proton exchange membranes were prepared. With the increasing content of epoxy resin semi-interpenetrating network structure, the thermal properties of the proton exchange membrane are also increased. Covered with crosslinked network structure, the more long chain of SPEEK and graphene oxide particles, the more thermal performance improved. The methanol permeable concentration is relatively close with pure SPEEK proton exchange membrane. The concentration of methanol permeability decreases with the increase of epoxy resin content. The semi-interpenetrating network structure increase the interaction with the matrix bonds and reduce the sulfonic acid groups on the excessive absorption of water molecules. But the membrane structure still exist problems such as density, which due to the loss of doped sulfonated graphene oxide. But there are only semi-interpenetrating network cannot be fully resolved.

Keywords: Electrochemical properties, proton exchange membrane, Graphene oxide, doping

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