



## Effect of O<sub>2</sub> Mass Transport Coefficients at the Pt | Binder Interface on the Performance of High Temperature Proton Exchange Membrane Fuel Cell by Microelectrode Method

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**Abstract:** Oxygen mass transport in cathode catalyst layer (CCL) of high temperature proton exchange membrane fuel cells (HT-PEMFCs) plays an important role in promoting the fuel cell performance and improving the Pt utilization owing to the oxygen mass transport resistance resulting from the binder existing in CCL. However, there are no direct and quantitative evidences to illustrate the effect of different binder on O<sub>2</sub> mass transport. In addition, phosphoric acid (PA) leaching caused durability problems for HT-PEMFCs. However, the effect of PA leaching on O<sub>2</sub> mass transport in binder was also rarely investigated. The purpose of this study is to provide quantitative oxygen mass transport coefficients in PES-PVP membrane as a function of poly(vinyl pyrrolidone) (PVP) content and PA doping level. In this study, oxygen mass transport behavior is reported for poly(ethersulphone)-poly(vinyl pyrrolidone) (PES-PVP) blend membrane. Electrochemical mass transport parameters are determined by potential step chronoamperometry using Pt microdisk solid-state electrochemical cell, in O<sub>2</sub> at 25°C, with PVP content controlled between 40wt% and 80wt% and with PA treatment time controlled between 1h and 12h. The oxygen diffusion coefficient (D<sub>O<sub>2</sub></sub>), oxygen concentration (c<sub>O<sub>2</sub></sub>), and oxygen permeability (D<sub>O<sub>2</sub></sub>•c<sub>O<sub>2</sub></sub>) were obtained by linear regression analysis of the current transients using the Cottrell equation.

**Biography:** Shuomeng Zhang is a postgraduate in the institute of chemical and biological engineering, Zhejiang University, China. He has expertise in high temperature proton exchange membrane fuel cell.



### Publications:

1. Novitski D M, Kosakian A, Weissbach T, et al. Electrochemical Reduction of Dissolved Oxygen in Alkaline, Solid Polymer Electrolyte Films[J].
2. Novitski D, Holdcroft S. Determination of O<sub>2</sub> Mass Transport at the Pt|PFSA Ionomer Interface under Reduced Relative Humidity[J].
3. Xu X, Wang H, Lu S, et al. A novel phosphoric acid doped poly(ethersulphone)-poly(vinyl pyrrolidone) blend membrane for high-temperature proton exchange membrane fuel cells[J].
4. Mack F, Morawietz T, Hiesgen R, et al. Influence of the polytetrafluoroethylene content on the performance of high-temperature polymer electrolyte membrane fuel cell electrodes[J].
5. Lobato J, Cañizares P, Rodrigo M A, et al. Study of the influence of the amount of PBI-H<sub>3</sub>PO<sub>4</sub> in the catalytic layer of a high temperature PEMFC[J].

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