References

[1] Mehta V, Cooper JS. Review and analysis of PEM fuel cell design and manufacturing. J Power Sources 2003;114:32–53.

[2] Litster S, McLean G. PEM fuel cell electrodes. J Power Sources 2004;130:61–76.

[3] Tawfik H, Hung Y, Mahajan D. Metal bipolar plates for PEM fuel cell - A review. J Power Sources 2007;163:755–67.

[4] Shao YY, Yin GP, Wang ZB, Gao YZ. Proton exchange membrane fuel cell from low temperature to high temperature: Material challenges. J Power Sources 2007;167:235–42.

[5] Wee JH. Applications of proton exchange membrane fuel cell systems. Renew Sust Energ Rev 2007;11:1720–38.

[6] Hamrock SJ, Yandrasits MA. Proton exchange membranes for fuel cell applications. Polym Rev 2006;46:219–44.

[7] Erdinc O, Uzunoglu M. Recent trends in PEM fuel cell-powered hybrid systems: Investigation of application areas, design architectures and energy management approaches. Renew Sust Energ Rev n.d.;14:2874–84.

[8] X. Cheng, B. Yi, M. Han, J. Zhang, Y. Qiao, Yu J. Investigation of platinum utilization and morphology in catalyst layer of polymer electrolyte fuel cells. J Power Sources 1999;79:75–81.

[9] Y.-G. Chun, C.-S. Kim, D.-H. Peck, D.-R. Shin. Performance of a polymer electrolyte membrane fuel cells at ultra-low platinum loading. J Power Sources 1998;71:174–8.

[10] A. Lindermeir, G. Rosenthal, U. Kunz, U. Hoffmann. On the question of MEA preparation for DMFCs. J Power Sources 2004;129:180–7.

[11] Liu C-Y, Sung C-C. A review of the performance and analysis of proton exchange membrane fuel cell membrane electrode assemblies. Journal of Power Sources 2012;220:348–53.

[12] S. Gottesfeld, M. Wilson. Hign performance catalyzed membrane of ultra-low Pt loading for polymer electrolyte fuel cells. J Electrochem Soc 1992;139:L28–30.

[13] S. Gottesfeld, T. Zawodzinski. Polymer electrolyte fuel cells. Adv Electrochem Sci Eng 1997;5:195–301.

[14] Gottesfeld S, Wilson M. Thin film catayst layers for polymer electrolyte fuel cell electrodes. J Appl Electrochem 1992;22:1.

[15] Gülzow E, Schulze M, Wagner N, Kaz T, Reissner R, Steinhilber G, et al. Dry layer preparation and characterization of polymer electrolyte fuel cell components. Journal of Power Sources 2000;86:352–62.

[16] Th. Frey, M. Linardi. Effects of membrane electrode assembly preparation on the polymer electrolyte membrane fuel cell performance. Electrochim Acta 2004;50:99–105.

[17] Kim H, Subramanian NP, Popov BN. Preparation of PEM fuel cell electrodes using pulse electrodeposition. Journal of Power Sources 2004;138:14–24.

[18] Wei ZD, Chan SH, Li LL, Cai HF, Xia ZT, Sun CX. Electrodepositing Pt on a Nafion-bonded carbon electrode as a catalyzed electrode for oxygen reduction reaction. Electrochimica Acta 2005;50:2279–87.

[19] Xiong L, Manthiram A. High performance membrane-electrode assemblies with ultra-low Pt loading for proton exchange membrane fuel cells. Electrochimica Acta 2005;50:3200–4.

[20] O'Hayre R, Lee S-J, Cha S-W, Prinz FB. A sharp peak in the performance of sputtered platinum fuel cells at ultra-low platinum loading. Journal of Power Sources 2002;109:483–93.

[21] Tang Z, Poh CK, Chin KC, Chua DHC, Lin J, Wee ATS. Cobalt coated electrodes for high efficiency PEM fuel cells by plasma sputtering deposition. Journal of Applied Electrochemistry 2009;39:1821–6.

[22] B. Millington, V. Whipple, Pollet BG. A novel method for preparing proton exchange membrane fuel cell electroldes by the ultrasonic-spray technique. J Power Sources 2011;196:8500–8.

[23] T.-H. Huang, H.-L. Shen, T.-C. Jao, F.-B. Weng, Su A. Ultra-low Pt loading for proton exchange membrane fuel cell by catalyst coating technique with ultrasonic spray coating machine. Int J Hydrogen Energ 2012;in press:doi:10.1016/j.ijhydene.2012.04.108.

[24] Zheng Q, Cheng X, Jao T-C, Weng F-B, Su A, Chiang Y-C. Fuel cell performances at optimized Nafion and Ru85/Se15 loadings in cathode catalyst layer. Journal of Power Sources 2012;201:151–8.

[25] Z. Qi, Kaufman A. Low Pt loading high performance cathodes for PEM fuel cells. J Power Soureces 2003;113.

[26] S. Gamburzev, Appleby AJ. Recent progress in performance improvment of the proton exchange membrane fuel cell. J Power Sources 2002;107:5–12.

[27] E. Passalacqua, F. Lufrano, G. Squadrito, A. Patti, Giorgi L. Nafion content in the catalyst layer of polymer electrolyte fuel cells: effects on structure and performance. Electrochim Acta 2001;46:799–805.

[28] K. Punyawudho, D. A. Blom, J. W. Van Zee, Monnier JR. Comparison of different methods for determination of Pt surface site concentrations for supported Pt electrocatalysts. Electrochim Acta 2010;55:5349–56.

[29] Marković NM, Grgur BN, Ross PN. Temperature-dependent hydrogen electrochemistry on platinum low-index single-crystal surfaces in acid solutions. Journal of Physical Chemistry B 1997;101:5405–13.

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Figure 8. Cyclic voltammetry of MEA (49.3% Nafion : Pt/C) with surface area of 23 cm^2 scanned from open circuit voltage (OCV) to 1.14 V with scanning rate of 25 mV/sec, cell temperature of 75 °C, H_2/N_2 (A/C) at 300/300 sccm, ambient pressure, and 95% RH both anode and cathode.