

**Preparation of high efficiency platinum catalyst on single layer gas diffusion layer for PEMFC by electrodeposition method**

**Chung-Ching Wu<sup>3</sup>, Hong-Fan Lee<sup>1</sup>, Yui Whei Chen-Yang<sup>1,2,\*</sup>**

<sup>1</sup>Department of Chemistry, <sup>2</sup>Center for Nanotechnology, <sup>3</sup>Master Program in Nanotechnology

Chung Yuan Christian University, 200 Chung-Pei Road, Chung-Li 32023, Taiwan (R.O.C.)

**Abstract**

The novel platinum catalyst (PC) deposited single layer gas diffusion electrodes (SL-GDEs) for proton exchange membrane fuel cell (PEMFC) were successfully prepared by the pulse electrodeposition (PED) method with various parameters. The surface morphology, particle size, crystallinity and electrocatalytic activity of the PC on SL-GDEs were investigated by SEM, XRD, and cyclic voltammetry (CV) measurements. It was found that the PC particles were well-dispersed on the surface of the as prepared SL-GDLs. The highest efficiency SL-GDE, 200PA1-2, was obtained by the PED with current density = 200 mAcm<sup>-2</sup>, T<sub>on</sub>/T<sub>off</sub> = 0.001/0.005s and charge density = 1Ccm<sup>-2</sup>. In order to investigate the effect of the SL-GDE on the performance of PEMFC, the MEA, M200PA1-2, was fabricated by 200PA1-2 with 0.04 mgcm<sup>-2</sup> of Pt loading and Nafion<sup>®</sup> NRE-212. The performance was carried out by a home-made single cell test instrument under the humidified H<sub>2</sub>/O<sub>2</sub> gases at 80 °C. The result showed that the best current and power density at 0.4 V was 200 mAcm<sup>-2</sup> and 79 mWcm<sup>-2</sup>, respectively. This corresponded to 988 Wg<sup>-1</sup> of the platinum mass specific power and was 136% and 168% higher than that obtained from GDE-600, a commercial carbon

paper GDE coated with 0.4 mgcm<sup>-2</sup> of Pt loading. This study indicated that the SL-GDE prepared is a potential GDE for PEMFC.

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