Supplementary Material (ESI) for Journal of Materials Chemistry


# Diffusion-Limited Reduction of Organometallic Compound on Carbon Nanofiber Mat for Catalytic Applications

**Nguyen Thi Xuyen,[a] David V. Sanchez,[b] Tae Hyung Kim,[a] Ho Il Park,[b] Minhee Yun[b] and Young Hee Lee*[ac]**

[a]Sungkyunkwan Advanced Institute of Nanotechnology, Sungkyunkwan University, Suwon 440-746, Korea. Fax: +82 31 290 5954; Tel: +82 31 299 6507

[b]Department of Electrical and Computer Engineering, University of Pittsburgh, PA, 15261, USA.

[c]Department of Physics, Department of Energy Science, Sungkyunkwan Advanced Institute of Nanotechnology, Sungkyunkwan University, Suwon 440-746, Korea. Fax: +82 31 290 5954; Tel: +82 31 299 6507

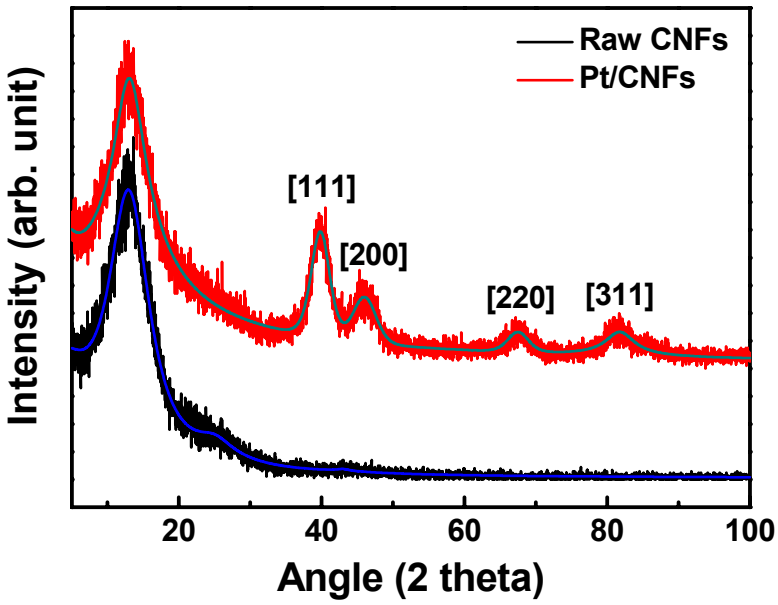


**Figure S1.** XRD data of raw CNF mat (back curve) and Pt-loaded CNF mat (red curve). The fitting curves were performed by using Pearson VII equation. The particle size was calculated by Sherrer equation from peak [111], [200], and [220]. The average size of Pt nanoparticles is 2.9 ± 0.4 nm.

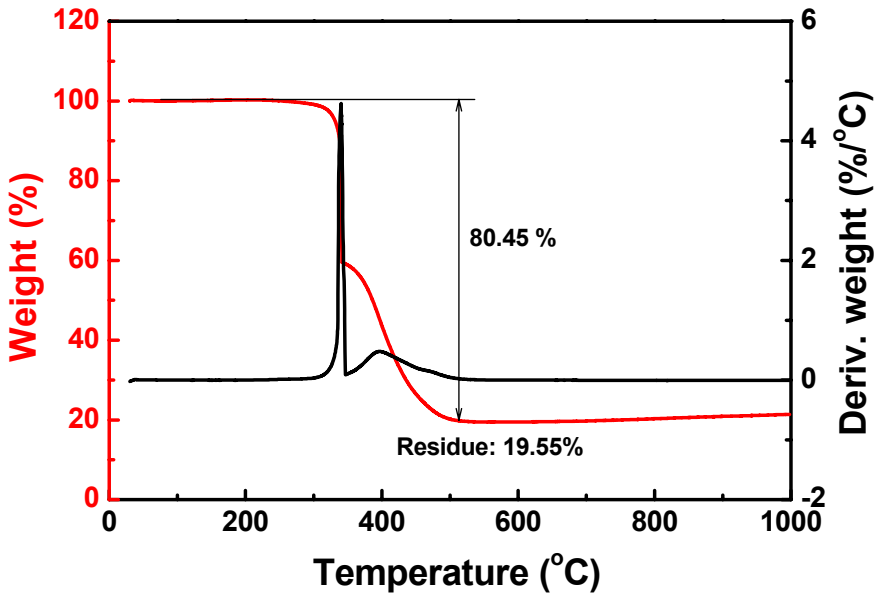


**Figure S2.** TGA of Pt-loaded CNF mat of which the surrounding space was confined during reduction process. The residue amount of 19.55 wt% is the amount of Pt nanoparticles loaded on CNF mat.

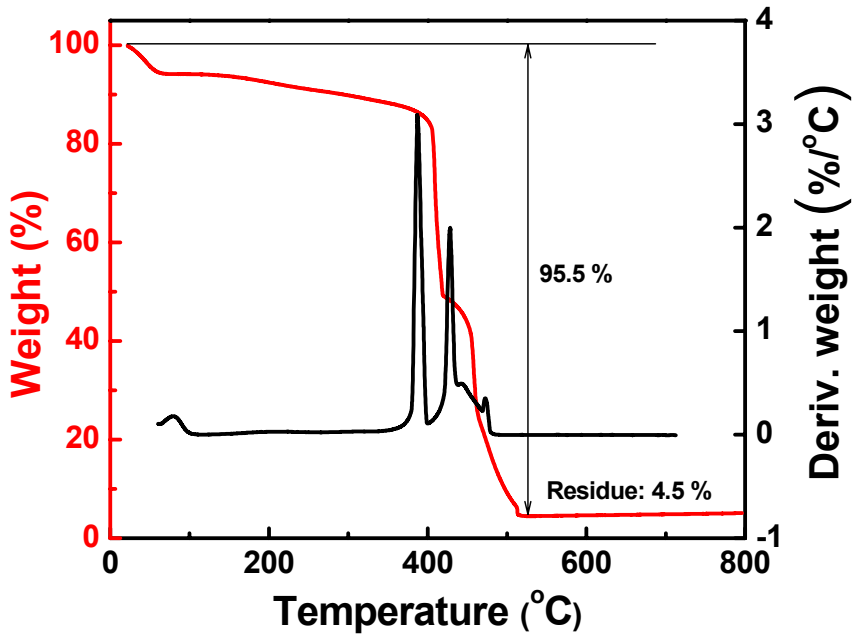


**Figure S3.** TGA of Pt-loaded CNF mat which was exposed to the surrounding environment. The residue amount of 4.5 wt% is the amount of Pt nanoparticles loaded on CNF mat.

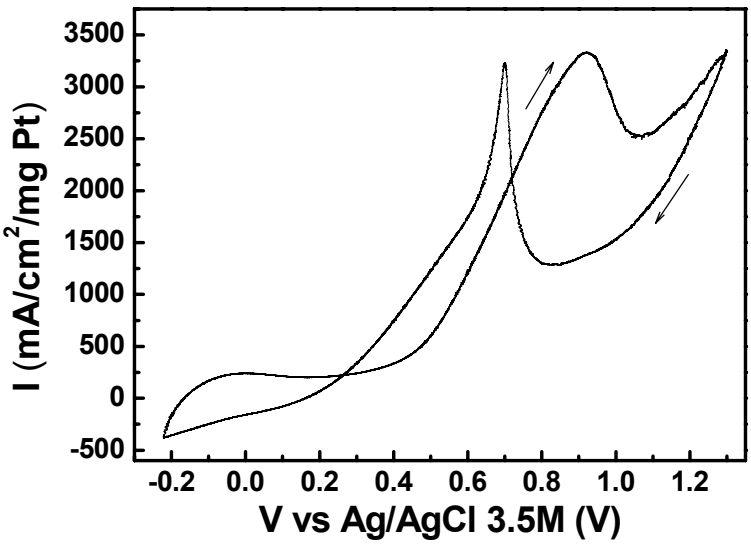


**Figure S4.** Cyclic voltammetry of Pt/CNFs after electrochemical treatment in 1 M methanol and 0.5 M $H_2SO_4$ at a scanning rate of 50 mV/s. The curve was up shifted due to the addition of the capacitance effect of the carbon nanofiber. This phenomenon was also observed in the previous work (H. P. Liang, T. G. J. Jones, N. S. Lawrence, L. Jiang, and J. S. Barnard, *J. Phys. Chem. C*, 2008, **112**, 4327-4332).

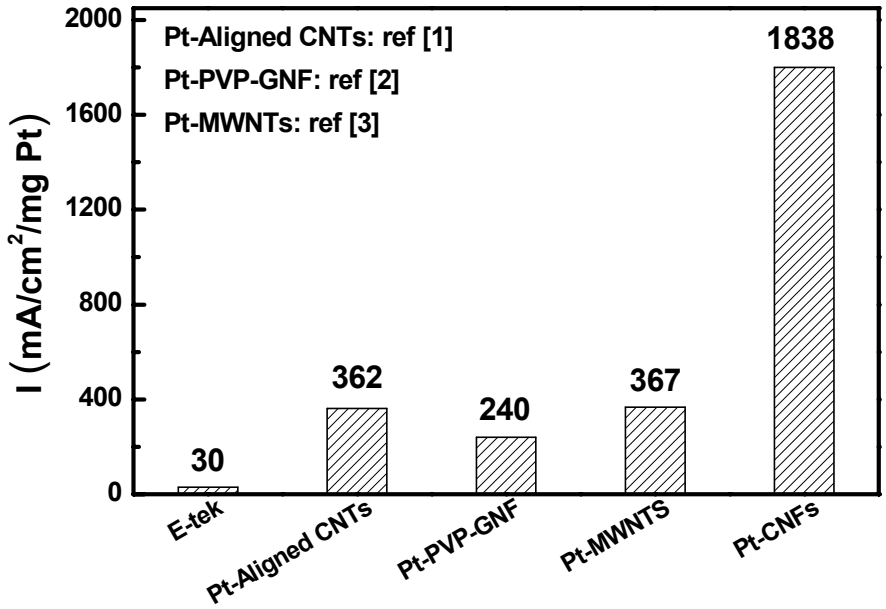


**Figure S5.** The comparison of maximum oxidation current among different samples and Pt-loaded CNFs.

1 Z. H. Wen, Q. Wang and J. H. Li, *Adv. Funct. Mater.,* 2008, **18***,* 959-964.
2 Y. L. Hsin, K. C. Hwang and C. T. Yeh, *J. Am. Chem. Soc.,* 2007, **129***,* 9999-10010.
3 L. Chen and G. Lu, *Electrochim. Acta,* 2008, **53***,* 4316-4323.

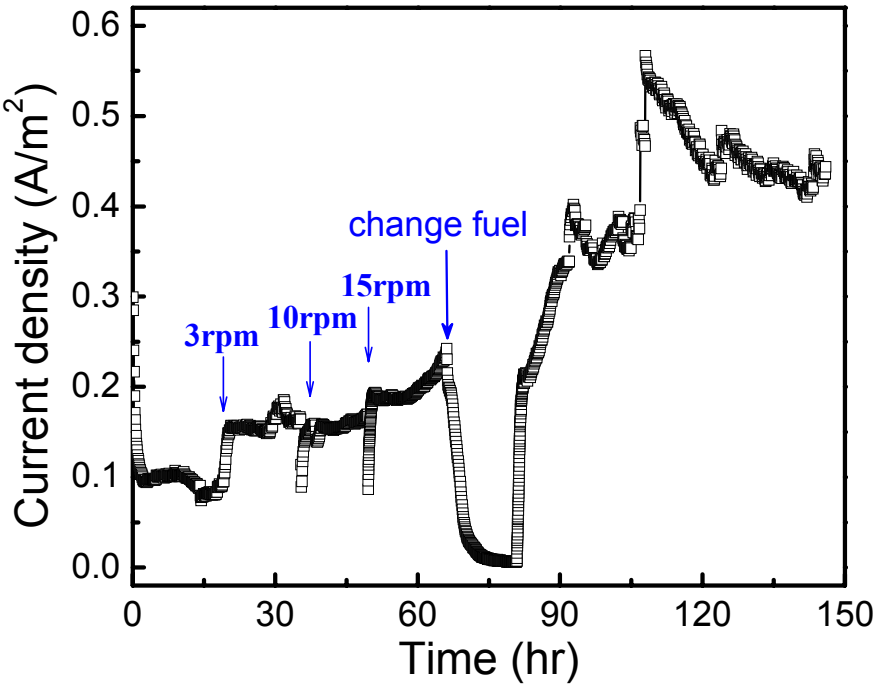


**Figure S6.** Current density of the electrochemical activated Pt loaded CNFs mat electrode on the anode compartments at fuel flow rate of 3 rpm, 10 rpm, and 15 rpm after the sample was used in the experiments of Fig. 4 and then exposed in air for ten days.