

# The size-engineered graphene nanosheets as support for Pd catalysts and its application to electrooxidation of alcohols

Yuseong Noh<sup>1</sup>, Changmin Lee<sup>1</sup>, Hyunsu Han<sup>1</sup>,  
Yoongon Kim<sup>1</sup>, and Won Bae Kim<sup>1\*</sup>

<sup>1</sup>Department of Chemical Engineering,  
Pohang University of Science and Technology  
(POSTECH), Republic of Korea.

\*E-mail: kimwb@postech.ac.kr

In the electrocatalytic reactions, the use of appropriate support materials is well known method to improve the properties and to overcome the problems of catalysts. [1] The physicochemical characteristics of support materials significantly affect not only to the deposition of active catalyst but also to the performances of catalytic system. [2] Graphene, which is one of the most popular electrode materials, also shows various properties according to their morphologies. [3]

In this work, we found that the electrocatalytic activities indeed depend on the morphology of graphene support. First, size-selected graphene oxides (GOs) were prepared by modified Hummers method and followed by pH induced separation procedure. To synthesize the catalysts for electrochemical reactions, Pd nanoparticles as the active catalysts were deposited on the graphene support with different nanosheet size via microwave-assisted polyol method. The simultaneous reductions of Pd precursor and GO were conducted by ethylene glycol solution. From the diverse characterization tools, we found that the polycrystalline Pd nanoparticles were well dispersed on the graphene, and these prepared catalysts (Pd/Gs) were applied for electrooxidation of alcohols in alkaline media. The results of electrochemical analysis showed that the higher performance of Pd catalyst was obtained with the smaller graphene support (Pd/S-G), which is caused by enhanced active sites and mass transportation. Consequently, the morphology, particularly the size of graphene support can provide various advantages to the catalytic systems, and considerably affect to its performances.

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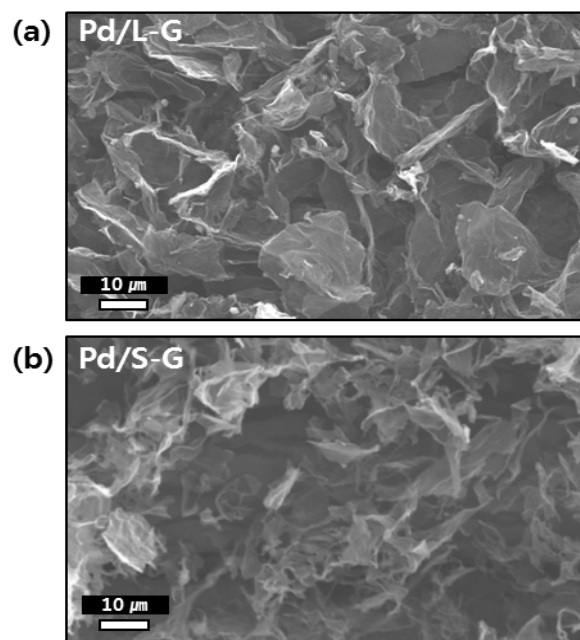


Fig. 1. scanning electron microscope (SEM) images of (a) Pd/L-G and (b) Pd/S-G catalysts.

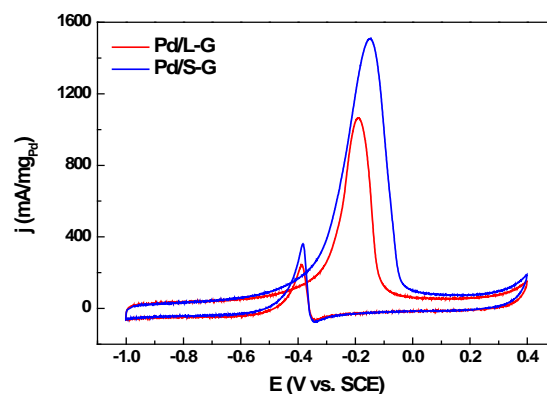


Fig. 2. Cyclic voltammograms of the Pd/L-G and Pd/S-G catalysts for methanol oxidation reaction

## REFERENCES

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