



SDI Review Form 1.6

Journal Name:	International Research Journal of Pure and Applied Chemistry
Manuscript Number:	2014_IRJPAC_9624
Title of the Manuscript:	Support Material Effect for Pt Catalytic Activity
Type of the Article	Original Research Article

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

To know the complete guideline for Peer Review process, reviewers are requested to visit this link:

(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)



SDI Review Form 1.6

PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
<u>Compulsory</u> REVISION comments	I highly recommend to reconsider the title, since is too generic, it does not quite describe the work presented in this manuscript. In the abstract, I suggest to avoid using non-standard abbreviations, such as GNS, N-G.	Thank you very much for your comments. I have modified my manuscript as your suggestion in yellow part below as: "Support Material Effect for Pt Catalytic Activity at Cathode". Thank you very much for your comments. I have modified my manuscript as your suggestion in yellow part below as: Abstract: "The graphene nano sheets (GNS) and nitrogen doped graphene (N-G) were used as supporting materials to deposit Pt particles in order to investigate the support material effect for oxygen reduction reaction (ORR) activity. The ORR activity of platinum on GNS (Pt/GNS) is higher than Pt/N-G catalysts. This suggests that the modification of π states by the N-doping change the properties of the interaction between Pt and carbon. The interaction between Pt and graphene is considered to be π-d hybridization. Therefore, one can control the electronic structure of graphene and Pt by doping of some elements. In addition, the large surface area of N-G due to it has



SDI Review Form 1.6

	Besides, it is evident that a significant effort in rewording this section is required in order to comply with journal's standard. For instance there is no mention of the techniques the authors employed to prove that catalytic activity in Pt/GNS is higher than Pt/N-G.	more sites on which the oxygen binding is very strong. It causes the ORR catalytic activity of N-G is lower than GNS”. Thank you very much for your comments. I used many references as comparison for my manuscript in introduction, including techniques and results which have been reported by the other authors. For instance: “The platinum (Pt) nano-particles supported on carbon black (Pt/CB) are most used for ORR catalysts. It has outstanding catalytic and electrical properties [4]; Many researchers have reported novel carbon support materials, such as carbon nano-horns [11], carbon nano-coils [12], carbon nano-tube (CNT) [13], graphite nano-fibers (GNFs) [14], and carbon black [15] for PEMFC applications; Some papers also reported that nitrogen-doped carbon nano-tube (N-CNT) with metal catalysts or without metals exhibit enhancement catalytic activity toward ORR [16] and Moreover, fuel cell tests with Pt/GNS catalysts as cathode materials showed a considerably lower performance than that of the cell with Pt/CB as cathode catalyst [20].
--	--	---



SDI Review Form 1.6

	Another important issue that must be addressed is the fact that in the experimental section, several techniques are described, <i>i.e.</i> XPS, XRD, BET, TG/DTA, TEM, CV, RRDE. However, the author does not show or even discuss most of the results obtained from such analysis; neither a supplemental file is attached.	Thank you very much for your comments. I have modified my manuscript as your suggestion in yellow part below as: “XRD and TG/DTA data can be seen in supporting information (Figure 1S and 2S). Figure 1S confirmed that 20 wt % Pt is supported on GNS, N-G and CB (commercial) by TG/DTA measurements. It indicates that all the Pt atoms in the catalyst precursors are included in the 20 wt % Pt/GNS and Pt/N-G catalysts. As shown in Figure 1S, the amounts of Pt on GNS and N-G are exactly the same as those calculated in the catalyst preparation procedure. The results indicate that all the Pt atoms in the catalyst precursors are included in the 20 wt% Pt/GNS and Pt/N-G catalysts. I can thus control the amount of Pt on GNS and N-G exactly so that one can evaluate the relationship among the particle size, the electronic structure, and the oxygen reduction reaction (ORR) catalytic activity of the Pt on GNS and N-G. Figure 2S shows XRD patterns at 2θ Bragg angles around 25° and 39° corresponding to C(002) and Pt(111) for the 20 wt% Pt/GNS, Pt/N-G and Pt/CB (commercial) catalysts, respectively. The C(002) peak appears weak and broad for Pt/GNS and Pt/N-G catalysts. The weak and broad
--	--	--



SDI Review Form 1.6

	As a researcher, I am not quite convinced that there is a clear trend on the effect of the support. I would examine all the experimental results; not just only RRDE to state a higher catalytic activity of Pt/GNS. Also is quite vague to attribute such increase in catalytic activity to a change in the electronic structure of Pt. What does have to do such change with the support? I wonder if it is not only the fact that Pt/GNS exhibits the smallest particle size of all systems under study, which make it the best catalyst. I would like to get an explanation about why the electronic structure might change using a different carbonaceous support; rather than	peaks at around 250 ($d = 3.5 \text{ \AA}$) means graphene sheets are formed successfully. However, some graphitic (stacked graphene) species should remain due to the weak peak at 250 suggesting a stacking of graphene to some extent. The Pt (111) peak was very weak for all the Pt/GNS and Pt/N-G catalysts. This suggests that the Pt clusters below 1.5 nm is formed. The weak XRD peaks of Pt are characteristic for Pt/GNS catalysts [1], in contrast to the Pt/CB catalysts showing intense XRD peaks of Pt (Figure 2S). The weak and broad peaks of Pt(111) for the Pt/GNS catalysts indicate that very small particles of Pt ($< 2 \text{ nm}$) were formed on graphene”. Thank you very much for your comments. I have modified my manuscript as your suggestion in yellow part below as: “I suppose there are two factors which affect it namely the support material effect and Pt subnano-clusters. At the same amount (20 wt % Pt), Pt supported on GNS has the highest ORR catalytic activity among Pt/N-G and Pt/CB. It is caused the support material effect. In addition, in term of Pt/CB, there is no Pt subnano clusters are formed. On the other hand, Pt subnano
--	--	--



SDI Review Form 1.6

	simply changing due to the morphology of the Pt nanoparticles.	clusters are formed on GNS and N-G. It is responsible causing the ORR catalytic activity of Pt/GNS and Pt/N-G is higher than Pt/CB”.
--	---	--



SDI Review Form 1.6

<u>Minor</u> REVISION comments	Please, consider checking the grammar and readability of the whole manuscript. Just to mention some of the issues found in the first page: Line 17: ...for ORR is the main challenge. Line 18: This is caused catalysts exhibit great... Line 19: The platinum (Pt) nano-particles supported on... Line 23: ...Pt price is expensive... The language is not adequate, it is clearly not formal, and the author tends to write sentences clearly personalised.	Thank you very much for your comments. I have modified my manuscript as your suggestion in yellow part
<u>Optional/General</u> comments		