ISSN (Online) 2456 -1304

International Journal of Science, Engineering and Management (IJSEM)
Vol 2, Issue 6, June 2017

Application of Nano Science in Direct Methanol Fuel Cell (DMFC)

[1] Suman Rani
Govt. P.G. College Jind

Abstract:- **The fuel cell has high energy conversion efficiency and low pollutant emission. The amount of noble metal used in Direct Methanol Fuel cell (DMFC) can be decreased by the use of Platinum nanoparticle, graphene, single walled and multiwalled carbon nano tube. Thus performance of DMFC fuel cell can be increase by controlling the packing density of Pt. nano particle1. They can reduce the amount of Pt. needed. The following aspects are described in this paper: The method used to reduce the Platinum, improving the performance of fuel cell catalyst, the effect of carbon nanotube on fuel cell. We summarise the some of the result of previous studies and raise expectations for microscopic state study for the future research**

I. INTRODUCTION

Nanotechnology has wide application. It has application in medicine, engineering, chemical science, physics. Specially it has wide range of application in medical science. Today nanosize drugs are widely used. Nanoscience is also going towards chemical science also. In electrochemistry, specially in fuel cell. In which we can use graphene supported electrode, platinum nanoparticles which increase its efficiency, life time performance. By use of nanotube electrode stability of fuel cell can be increase. Pt/graphen electrodecan be used for oxidation of ch3oh in DMFC. Researchers at brookhaven national lab are reporting the development of a 'nanoplate' catalyst using platinum and lead that has reduction and a long lifetime.Pt/graphene electrode reduce the problem of pt electrode poisoining by co-absorbance. It reduce the electrode poisoing. Finally some results of direct methanol fuel cell are given.

Pt Electrode in Direct Methanol fuel cell

In direct methanol fuel cell at the anode oxidation of methanol take palce and at the cathode reduction of O2 take place, H+ ion move through the electrolytic membrane which combine it with OH- to form H2O molecule and high amount of energy. Here we use CH3OH as direct fuel. It has better application.

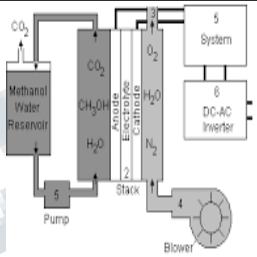
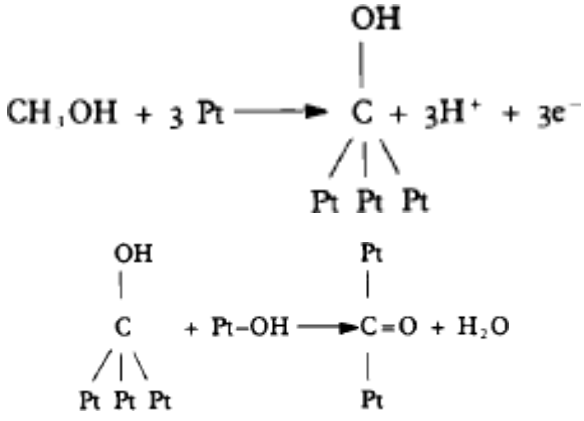


Figure 1 Direct methanole fuel cells

In recent workers are using spectroscopic studied to see that CO is bonded to Pt2,3. Next step involves the reaction of H2O or OH- to form CO2. High potential are required for this. There is again some argument as the nature of this oxygen containing species is because catalytic activity are adsorbed at lower potential then at which H2O is adsorbed to produce adsorbed OH species . Generally accepted mechanism involves the reaction of COH species with OH species adsorbed on Pt as follows.



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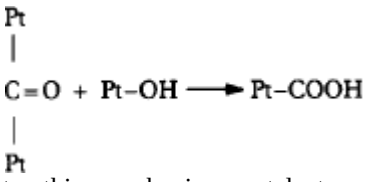

According to this mechanism catalyst must be dual functional, that is to say it must electrosorb methanol and water in the same potential region. Several workers have measured initial current which were 10000 to 100000 times higher than to so called steady state current which was found after a few minute on an anode test4 . Activity of electrode in DMFC depend on catalyst formulation, catalyst support, electrode structure. Pt/ graphene electrode reduce the electrode poisoning or increased efficiency of DMFC.

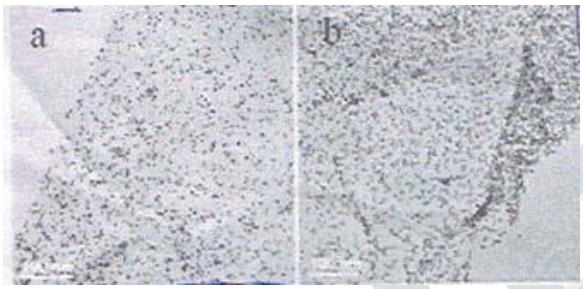

Figure 2,3 TEM images of Pt/graphene nanocomposities synthesized from precursor with different mass ratio(a)1:1 (b)1:1.5

Electrocatalytic activity of Pt/graphene catalyst towards methanol oxidation:

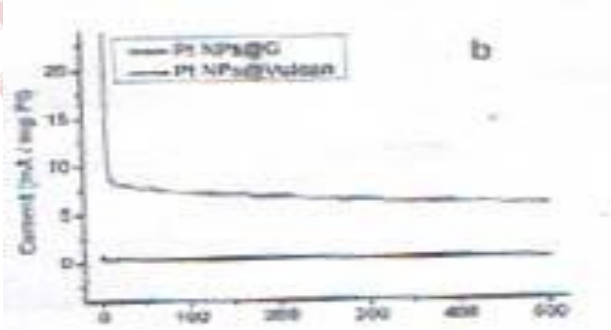

Figure 4 Current –time profile of these electrodes at 0.6 v (vs RHE) in a N2 saturated solution of 0.5 M H2SO4 Solution containing 1 M CH3OH.

The chronoamperometric profile Pt NPs G/GCE and Pt NPs@vulcan / GCE at 0.6 v v/s RHE were recorded in saturated soluation of 0.5 mH2SO4 soluation containing 1Mch3OH for 500 s Fig. 4 shows that the steady state polaritsation for NPS@vulcan/GCE during the whole testing time.

II. CONCLUSION

In summary conclusion is that the resultant PtNPs@G/GCE shows much higher catalytic activity and long term stability towards the electrooxidation of methanol demonstrating that graphene is a much better catalyst support. The present approach can be extended for the preparation of other noble metal on graphene for electrocatalysis.

REFERENCE

1. Choi SM,Seo MH, Kim HJetal(2011) synthesis of surface fuctionalized graphene nano sheets with high Pt loading and their application to methanol electro oxidation. Carbon 49: 904-909

2. K. Kordesch and A. Marko, Oesterr. Chem. Ztg., 1951, 52, 125

3. G. Ciprios,, J. Batzold and M. Lieberman, “Advances in Energy Conversion Engineering”, A.S.M.E., 1967, 357 – 364

4. T. Ohta, A. Bostwick, T. Seyller, K. Horn and E. Rotenberg, Science, 2006, 313, 951–954