

## High Active Oxygen Reduction Electrocatalyst for Alkaline Fuel Cells and Metal-Air Batteries

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### Introduction

One of advantages of electrochemical power sources with alkaline electrolyte is the using, especially at oxygen electrode, of high active, non precious electrocatalyst, such as metals, metal oxides and pyrolyzed metal chelates, supported on high surface area carbons. It is well known that silver is active electrocatalyst for ORR in alkaline electrolyte (1). Supported on different carbons, silver was successfully used in air (oxygen) gas diffusion electrodes, but the overall activity of these catalysts in air electrode was only 20% higher compared to the activity of carbon support (2,3). The aim of this work is to present an improved method for preparation of Ag/C catalysts with significantly higher activity.

### Experimental

The procedure of deposition of silver on high active carbons is simple and similar to described earlier(3). Silver nitrate  $\text{AgNO}_3$  was dissolved in distilled water and after adding of carbon and stirring of suspension, water was eliminated by evaporation and drying. The obtained product was heated at high temperatures in air (method I) or in an inert atmosphere (method II) for 0.5 – 2 hours. The amount of silver on carbon was 5 – 12 wt.%. Four types of carbons were used as a support: activated carbon Norit SA-3 (Norit USA), carbon black Vulcan XC-72 (Cabot), acetylene black Shawinigan (Chevron) and graphite 287 (Johnson Matthey). One-typed double-layered air gas diffusion electrodes were prepared by the method described earlier (4). Steady-state polarization curves of electrodes at constant current were carried out in half cell arrangement at room temperature, 7n KOH as electrolyte, and zinc as a reference electrode.

### Results

On Figure 1 are presented polarization curves of one-typed air electrodes with different catalysts supported on Vulcan XC-72. The results show that the polarization characteristics of electrodes containing Ag/C catalysts produced by both methods I and II are practically equal to the characteristic of the electrode containing pyrolyzed CoTMPP, which is highest active ORR catalyst in alkaline media. The results obtained with different carbons, as well as the results from structural and physical characterization will be presented at the Meeting.

### References

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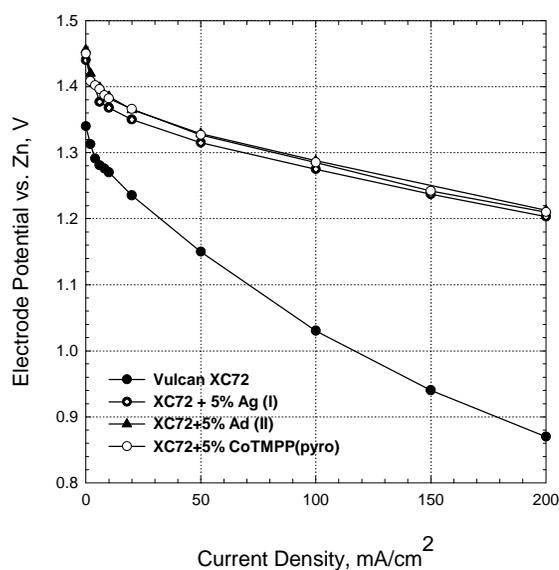


Figure 1. Polarization curves of air electrodes with different catalysts