Preparation and characterization of non-precious metal mesoporous carbon electrocatalysts for oxygen reduction reaction for fuel cell application

The aim of the presented project was to synthesize in laboratory organic catalyst towards the oxygen reduction reaction. This experiment helped us to know about the field of fuel cell electrocatalysis. This topic is quite relevant nowadays, because the carbon energy cycle is destroying our environment and one of the most important challenges of the 21st century is moving on from it.

All the laboratory procedures were described in the presentation. Firstly, the proposed catalyst was synthesized from honeyol, isopropanol, cobalt, iron, magnesium acetate (all the numbers and particular steps were shown, but we won't go into details in this report). To aid dissolution of reactants, an ultrasonic heater was used. The reacting mixture was stirred on the magnetic plate for 20 min and then oven dried at 60 degrees.

After the synthesis the pyrolysis was carried out: the oven dried organic material was put in the boat of the pyrolysis oven and programmed to work at 800 degrees for 2 hours.

Then the effectiveness of the obtained catalyst in different cases was tested. The electrochemical cell was prepared: it contained three electrodes — working electrode, the reference electrode and the counter electrode. The faradays current and capacitative current were measured. Based on this data, halfway potential value and the onset potential value were estimated. The number of electron transfer per reduction of oxygen value was also estimated to be 4.

The measurements showed that the synthesized catalyst mimics carbon electrode. Since the catalyst was made with organic materials, which are easy and cost effective, it is a good substitute for carbon. It was also showed, that the magnesium increases catalyst effectiveness, because it is said to increase the porosity of the catalyst making it have more active sites.

To sum up, the presentation was quite detailed and clear. However, too much text on the slides probably complicated the perception of the presentation. It is also worth noting the lack of photos and illustrations.