Lithium oxygen batteries; challenges and possibilities

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Lithium-air batteries are interesting because of their high energy density (600-800 mAh/g compare to ~300 mAh/g for Li-ion batteries). They are based on pure lithium metal as anode and a cathode that will help the reduction of oxygen in air. Most of the research has so far, been focused on lithium-air batteries as primary batteries. However, during recent years it has been shown that it can be made rechargeable [1-4]. Since then, this technology has attracted a lot of research interests. Figure 1 is a schematic representation of lithium-air batteries showing how the lithium-air batteries are working.

There are many parameters that effect the performance of a lithium oxygen battery, such as: cathode structure, anode morphology, electrolyte composition and how the cell assembling is carried out [5]. Figure 2 is a picture lithium-air battery assembled for our experiments.

The cathode is usually made of a porous carbon, a catalyst and a binder. The ratios of the materials contained in the cathode, the electrode porosity, the choice of catalyst material are as important as the structure and morphology of the ingoing compounds. These parameters should be considered when making a well function cathode.

In this presentation we will show how the performance of a lithium-air battery is influenced by a cell design based on an aluminum pouch cell. The need for hydrophobic membranes will be discussed and the examples are based on the use of MnO2 as the catalyst. The importance of the use of hydrophobic membranes for the reversibility during electrochemical cycling will be demonstrated.

Acknowledgements
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References

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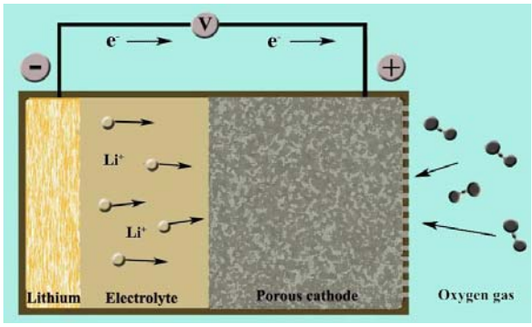

Fig. 1 Schematic representation of Lithium-air batteries

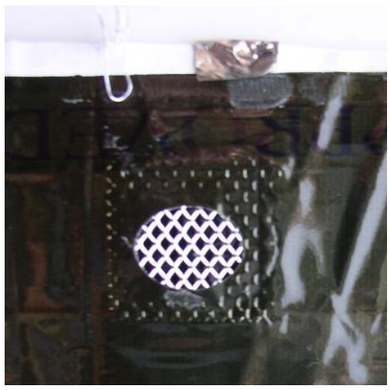

Fig. 2 Lithium-air package used for experiments