

Gas Diffusion Electrodes and Ionic Liquid Electrolytes for Secondary Zinc-Air Batteries: Electrochemical Characterization

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The cathodes of metal-air batteries are built by gas diffusion electrodes (GDEs) generally consisting of porous substrates which are coated with carbon supported oxygen reduction/evolution catalysts. The electrolyte used in metal-air cells has to meet all requirements of oxygen dissolution, metal ion conductivity, thermal and electrochemical stability, and strongly depends on the individual metal-air battery system. With respect to the development of rechargeable Zinc-air batteries, ionic liquids are considered to have great potential to overcome certain disadvantages of KOH, which is the common electrolyte in primary Zn-air batteries. Suitable candidates of this compound class are therefore intensively studied and tested for the use as electrolytes in secondary Zn-air cells.

Within the scope of this meeting, we present the evaluation of electrochemical characterization experiments on Zn-air gas diffusion electrodes containing different perovskite catalysts and different carbon supports. Catalytic activities with respect to the oxygen reduction reaction in ionic liquids were determined and compared to results obtained in aqueous alkaline solutions. In addition, different mixtures of ionic liquids and water were studied at different temperatures. The influence of catalyst, carbon support material, electrolyte and ambient conditions on the electrochemical properties of the considered GDEs was analyzed.