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(Research Article)
Effect of ultrasonic iradiation on structure and performance of electrolytic Manganese Dioxide nono particles as catalyst for Oxygen reduction reaction on Zinc-air battery

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Abstract

The variety of effects induced in electrochemical processes by ultrasound can lead to the production, growth and collapse of micro-bubbles in the electrolyte. The aim of this study was to investigate the effect of ultrasound and energy resulting from the collapse of microbubbles on the structure and catalytic efficiency of electrolytic manganese dioxide (EMD) for oxygen reduction reaction. In this study, MnO_2 nanoparticles were first produced by sono-electrochemical and electrochemical methods with voltage of 2800 mV and then phase identification of nanoparticles by XRD method, particle size and shape by electron microscope, the molecular structure by Raman and the pore size bt BET methode were done. We tested these two samples on a Zinc-Air battery as electrocatalysis for Oxygen Reduction Reaction. To investigate the electrochemical properties, the battery polarization and battery discharge at different battery currents and battery charge and discharge were used. The charge discharge, polarization curve and power density of the battery showed that manganese dioxide synthesized by sono-electrochemical method had better performance than the other sample, as well as battery voltage dependence on discharge time compared for as the synthesized samples. Also the resuls showed that at different discharge current densities (5-10-20-50-100-150-200 mA) in sono-electrochemical nanoparticles correlation between potential/time is more than in electrochemical nanoparticles.

Keywords: Electrolytic manganese dioxide, Sonoelectrochemistry, Catalist, Maximum power, Oxygen reduction rection.

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