DEVELOPMENT OF ELECTRODE MATERIAL BASED ON $MgMnO_2$ SYSTEM FOR Mg-ION BATTERY

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By

Rashmi Yashodha Wickramarathne

Science and Technology Degree Program

Uva Wellassa University,Sri Lanka

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ABSTRACT

This study was based on $MgMnO_2$ electrode material synthesized by a glycine nitrate combustion method which involves mixture of oxidizing reagents such as nitrates of metals and a fuel such as glycine which acts as a reducing reagent, and it is used as electrode active material for magnesium ion rechargeable batteries. In order to overcome some disadvantages of lithium and sodium ion batteries this magnesium application has done. Magnesium is an attractive element to use as electrode materials in batteries. It results in the storage of up to 2 electrons per Mg atom vs. one for Li and Na, resulting in a higher theoretical volumetric energy density and a specific capacity comparable to those of Li .And also metallic Mg is cheaper than metallic Li The atomic radius of Mg is smaller than that of Na and is comparable to Li. A smaller size is expected to result in higher diffusion rates and therefore a better battery rate capability can be obtained.

To replace the costly Li and Na electrode material system, characterization of $MgMnO_2$ was used. This study focused to synthesize $Mg_xMn_{1-x}O_2$, x = 0 - 10, via glycine nitrate process. This study showed the ability of preparing powder material by glycine nitrate combustion method. Performances of $MgMnO_2$ oxides as an electrode materials in magnesium ion batteries and its effect on electrochemical properties have been investigated by D.C four probe technique. The highest room temperature electrical conductivity of $MgMnO_2$ is about 4×10^{-7} Scm^{-1}, which is comparably law. The Vander Pauw method is one of the standard and most widely used methods for the measurement of resistivity of semiconductors in this research. The manufacture of materials selected electrodes carried out through tape casting and the electrical conductivity measured for tapes. It showed the ability of preparing suitable flexible solid electrodes by tape casting method for magnesium and manganese system.