AQUEOUS LIQUID SOLUTIONS FOR LI-LIQUID BATTERY

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The evolvement of Lithium-ion battery industries has begun to carry the industries to step in a new revolution. Consequently, high demand in high energy density batteries in many electronic and electrical appliances, especially energy storage industries been emerged. This new type of batteries has been in extensive research, such as lithium-water battery.

Lithium-water battery is a newly developed battery with lithium as the anode and water as the cathode. Lithium is known as one of the most reactive metals in periodic table. Therefore, rigorous reaction will be observed when lithium is reacted with water and hence potentially providing an extremely high energy density. This rigorous reaction can be converted into electrical energy and can be stored in a cell. Lithium-water battery is novel and hence, there is no standardized design.

In this presentation, lithium anode is separated from water by liquid electrolyte and a ceramic solid electrolyte. The glass-ceramic solid electrolyte which has $Li_{1.3}Ti_{1.7}Al_{0.3}(PO_4)_3$ composition plays an important role of the design of this lithium–water battery. The main purpose of the solid electrolyte is to separate water from lithium, avoiding a dangerous exothermic reaction. Also, the presence of the super-ionic conductor ceramic can provide very high lithium ion conductivity.

The different sizes of solid electrolytes were used in designing Li-liquid battery cell. The effect of the electrolyte size on the voltage of the cell was studied to optimize the cell design. Then, the aqueous solutions containing different chemicals were tested as the liquid cathodes, and their electrochemical performance were compared to those of the pure DI water. Further results will be presented in the poster presentation.

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