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Aluminium Air Battery is this the future of Battery Technology

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ABSTRACT

An aluminum

air battery that uses aluminum as the anode, oxygen in air as the cathode, and **an** electrolyte to support the reacti on. When the battery is discharged, aluminum reacts with oxygen to form aluminum hydroxide, releasing energ y in the **process.The description** of **the** research **data** on **the electric battery** can summarize the **results** and co nclusions of the **research.** It **will** contain information about the **efficiency,** effectiveness and potential **of the** use of **heating batteries** as well as new developments or **advances** in **this** field. **Abstracts provide concise summ aries** of research **articles,** allowing **readers** to quickly **grasp key concepts** without having to read the entire doc ument.

INTRODUCTION

Aluminum-air technology has been recently a strong alternative to traditional fossil fuels techniques to generate electrical energy. Aluminum-air battery waste by-products are environmentally friendly, making it a cleaner and more sustainable way to generate electricity. The convenient inherent characteristics of fuel cells Le. Aluminum-air battery such as the capability of fuel cell to produce electrical energy as long as the fuel lasts, makes this alternative a promising technology for the replacement of current environmentally unfriendly ways to generate electricity in the future. Different kind of fuels includes hydrogen, methanol, natural gas and aluminum which have been used as sources of these devices. Each of these fuel sources has its benefits and disadvantages and would be a best fit for particular application In this research endeavor, Aluminum Air Fuel Cells (Al-Air FC) Le Aluminum-air battery is investigated. There are several advantages of using Aluminum as fuel for portable applications. This is an abundant material in earth crust, the theoretical inherent limit of energy of aluminum is high and the low cost of aluminum with its full recyclability are really convenient. The FC generates electricity by converting the internal energy of aluminum, combined with water and oxygen, by a controlled chemical reaction. The waste byproduct of this reaction is entirely recyclable, which constitutes a great advantage in terms of sustainability and in decreasing the overall cost of the aluminum used as fuel. To create a model for Aluminum-Air battery in an academic level. The model will simulate Al-Air battery to get the SOC characteristics and terminal output voltage. The terminal output voltage is further boosted with boost converter for use as a backup device or in moving cars.

Methodology

Techniques Ironically, the technology used to generate electricity in the past ten years—fuel cells, or more specifically aluminum-air batteries—was created more than 160 years ago. English scientist Sir William Groove published his initial research on what he dubbed a "gaseous voltaic battery" in 1839.Early in the 1960s, significant research on aluminum as a source of electrical energy for batteries was conducted. A lot of study has been done on aluminum as the primary fuel source for many applications. One of the highest theoretical efficiency of any other metal mixed with air type of batteries is the high theoretical ampere hour capacity because of its high enthalpy, the voltage result, and the potential energy. The efforts were concentrated on heat issues and material issues at the air electrode.

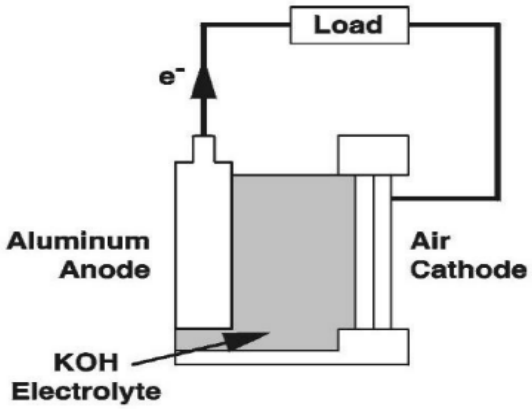

Figure 1: Schematic Aluminum-Air battery

Aluminum stick weight, aqueous solution volume, temperature, pressure, and random variations brought on by impurities are all regarded as primary inputs by Al/Air FC, which determines the output voltage based on these inputs. The electrochemistry reaction between reactants and the interaction with the solute is used to compute the open circuit voltage. When the fuel cell is operating, two main categories of losses are taken into consideration.

There are two ideas:

(a) The first idea is that the open circuit voltage and battery state of charge have a certain relationship. The voltage value will be low at zero percent, perhaps 2.6. At 100 percent charge, or full charge, we really obtain a somewhat higher voltage value of say, 3.6.

(b) The second idea is the way that states is updated at no cost? The cell's charge or discharge determines whether the AC increases or decreases. The state of charge at any given place would equal the initial state of charge, or the starting point; this is known as the Coulomb counting technique. and changing the amount of current entering or leaving the cell by adding or subtracting. However, we must first integrate it in order to integrate the current flowing through the cell. This is accomplished by adding up all of the current over a certain amount of time to get the total number of AMP hours that entered or exited the cell, then dividing that total by the cell's capacity (C). Knowing the beginning will inform someone about the C.

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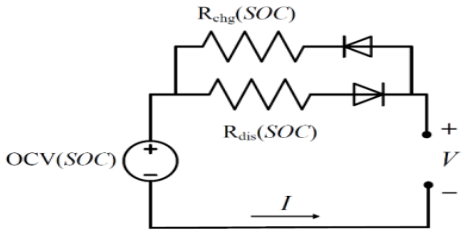

Figure 2: Battery Model charging-discharging

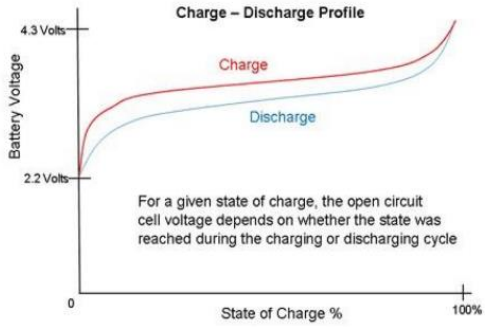

Figure 3: Graph of battery charging-discharging

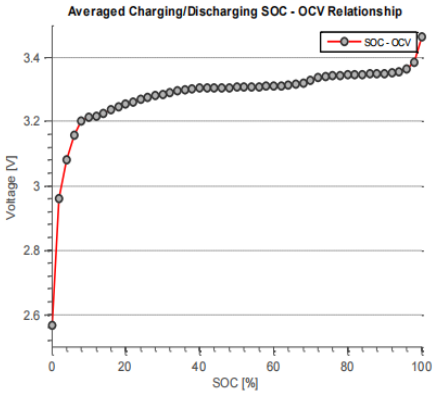

Figure 4: Average of charging and discharging SOC-OCV relationship

Future Scope

Higher energy density: In order to make all-aluminum air batteries more competitive with lithium-ion batteries, researchers are aiming to increase the energy density of these batteries. This may result in batteries with greater capacity and longevity for a variety of uses.

Cost-effective manufacturing: Because aluminum is abundant and inexpensive, it may be possible to produce all-aluminum air batteries at a cheaper cost than lithium-ion batteries. This might lower their cost and increase their accessibility for a larger variety of uses.

Environmental benefits: Aluminum air batteries are more environmentally friendly than lithium-ion **batteries because** they do not contain toxic **substances** and can be recycled more easily. This makes them more **efficient** for energy storage.

Grid-scale energy storage: **Aluminum** air **cells can** be used for grid-scale energy storage, helping to balance supply and demand **in** the **power** grid and **supporting** the integration of renewable energy sources **such as** solar and **wind.**

Conclusion

Matlab Simulink allows the user to design and analyze a complete Al-air battery model. Al-air battery SOC and terminal voltage output analysis proposed model. This implementation of the modelcan lead to further development of this technology. The Al-Air Battery Boost converter will take some time.The optimal delay response of this model is an open problem to be addressed in future research.The proposed model has been successfully tested with various types of converters. Al-Air FC model simulated using thea Boost converter and adjusting its parameters for optimal performance. Boost converter is selected based on the simulation. Further research is needed to make this technique more feasible. Especially in \pattern, control, voltage generation and aluminum alloys, which can improve the performance and reliability of such batteries.

Referance

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