Title: Aluminum Battery
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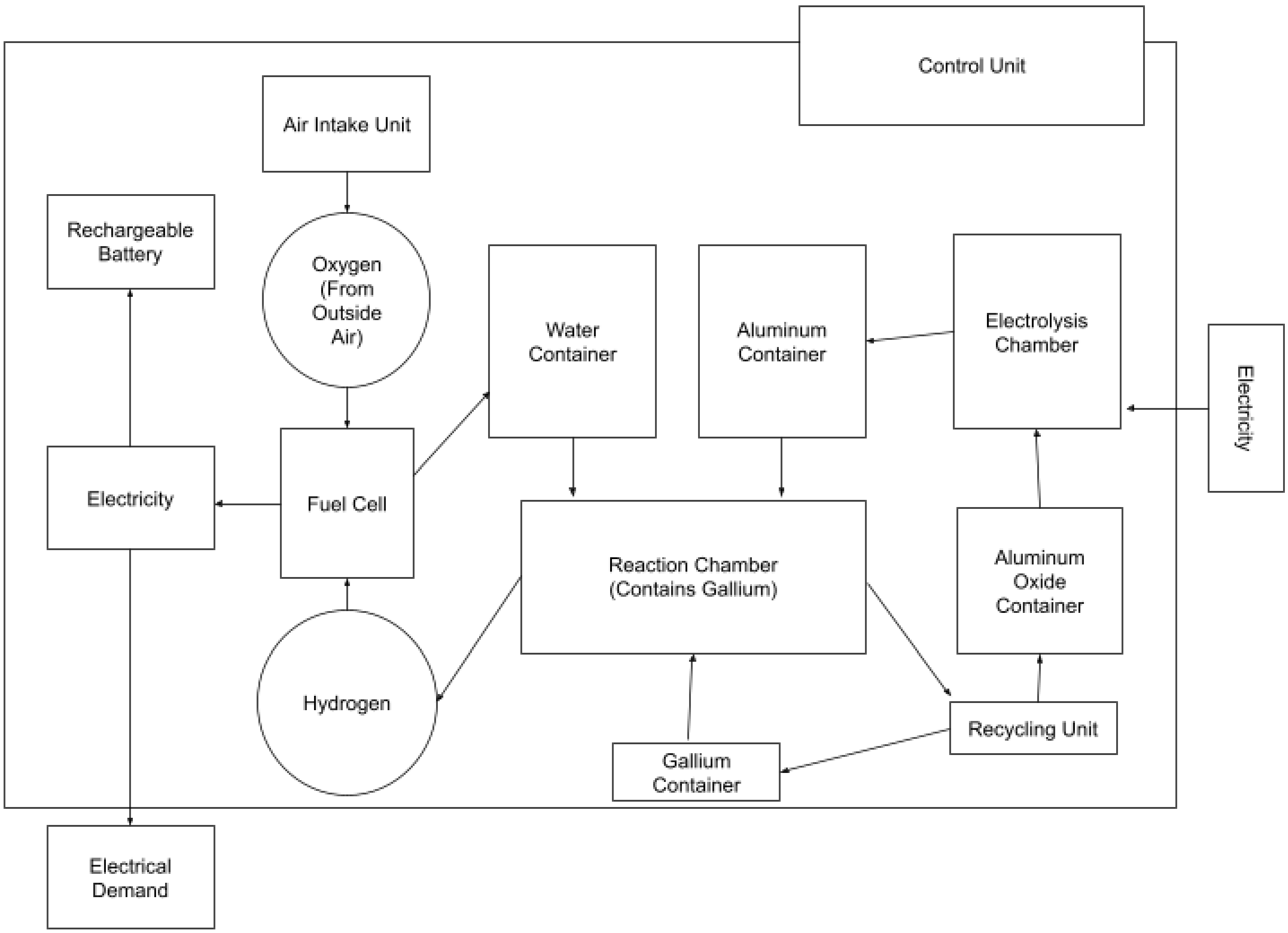
Introduction

In today's rapidly evolving energy landscape, the transition to renewable electricity generation is becoming increasingly imperative to combat climate change and reduce our dependence on fossil fuels. Renewable sources like solar and wind power offer clean and sustainable alternatives to traditional energy generation methods. However, these sources are inherently intermittent, dependent on weather conditions, and often produce surplus energy during periods of low demand. This unpredictability and variability in energy production underscore the critical need for large-scale batteries to store excess renewable energy and provide a reliable power supply when the sun isn't shining or the wind isn't blowing. Large-scale batteries serve as an essential component in ensuring a stable and resilient renewable energy grid, offering the potential to bridge the gap between energy supply and demand, reduce greenhouse gas emissions, and pave the way for a sustainable energy future.

Abstract

The following public disclosure outlines an energy system that fits inside of a standard sized cargo container and serves as a large battery. The system is composed of the following parts: A storage container for aluminum, A storage container for water, A storage container for gallium, A reaction chamber, A recycling unit, A fuel cell, A Rechargable Battery, A storage Container for Aluminum Oxide, A chamber for electrolysis, an air intake unit, and a control unit.

In short, aluminum,gallium, and water are introduced into the reaction chamber. The gallium erodes the thin oxide layer on the surface of the aluminum, allowing for it to react with water to form aluminum oxide and hydrogen gas. The resultant hydrogen gas is directed to a fuel cell where it combines with air from the atmosphere to produce electricity and water. The electricity generated is directed either to a rechargeable battery such as a lithium ion battery, or used immediately. The water generated is recycled back into the storage container containing water. The aluminum oxide gallium solution that is leftover from the reaction is then separated, first inside the reaction chamber, whereby the aluminum oxide is separated from the gallium and directed to a separate container called the recycling unit, which further purifies the solution removing any trace amounts of gallium left. The gallium generated in this last step of purification is then directed to a container that holds gallium, and the aluminum oxide remaining from the purification step is directed to a container that holds the aluminum oxide. The enclosed energy system can be recharged through electrolysis, whereby the Aluminum Oxide is converted back into Aluminum inside the Electrolysis chamber using electrolysis and returned to the container with Aluminum. By using inert anodes within the electrolysis process, the energy system can be cycled indefinitely. The controller unit monitors and adjusts the reactions according to the electricity demands of the user.



Claim 1: An energy system comprising various components, including a storage container for aluminum, a storage container for water, a storage container for gallium, a reaction chamber with gallium, a recycling unit, a fuel cell, a storage container for aluminum oxide, an electrolysis chamber, an air intake unit, and a control unit, said system configured to generate electricity through a chemical reaction process wherein aluminum, gallium, and water are introduced into the reaction chamber, where gallium erodes the surface oxide layer of aluminum, facilitating a reaction between water and aluminum to produce aluminum oxide and hydrogen gas.

Claim 2: The energy system of Claim 1, further comprising a mechanism to direct the generated hydrogen gas to a fuel cell, where it combines with atmospheric air to generate electricity and water.

Claim 3: The energy system of Claim 2, wherein the generated electricity is directed to a rechargeable battery, such as a lithium-ion battery, or utilized immediately.

Claim 4: The energy system of Claim 2, wherein the water produced during the reaction process is recycled and returned to the storage container containing water.

Claim 5: The energy system of Claim 1, wherein the remaining aluminum oxide from the reaction is directed to a recycling unit which removes any gallium in the solution, further refining and directing recovered gallium into a separate container for gallium.

Claim 6: The energy system of Claim 5, wherein the aluminum oxide undergoes electrolysis, a process that converts aluminum oxide back into aluminum within the electrolysis chamber and returns it to the aluminum storage container. The use of inert anodes allows the energy system to be rechargeable using electricity derived from outside the system without the need to replace components.

Claim 7: The energy system of Claim 1, wherein a control unit is employed to monitor and adjust the chemical reactions within the system in response to the electricity demands of the user, ensuring efficient and reliable energy generation.

Claim 8: The energy system of Claim 1, wherein the generated hydrogen gas can be alternatively directed to a combustion generator, where it is burned to produce mechanical energy.

Claim 9: The energy system of Claim 1, wherein the aluminum pellets are of a predetermined size and shape to optimize the efficiency of the reaction with the gallium catalyst.

Claim 10: The energy system as claimed in Claims 1-9, is adaptable for use as: a. A vehicle battery system, suitable for various types of vehicles, including but not limited to automobiles, trucks, and electric buses; or b. A standalone mass energy storage unit, capable of integration into cargo containers or other transportable configurations, facilitating efficient transportation and deployment.