METAL AIR BATTERIES – SCIENCE & TECHNOLOGY

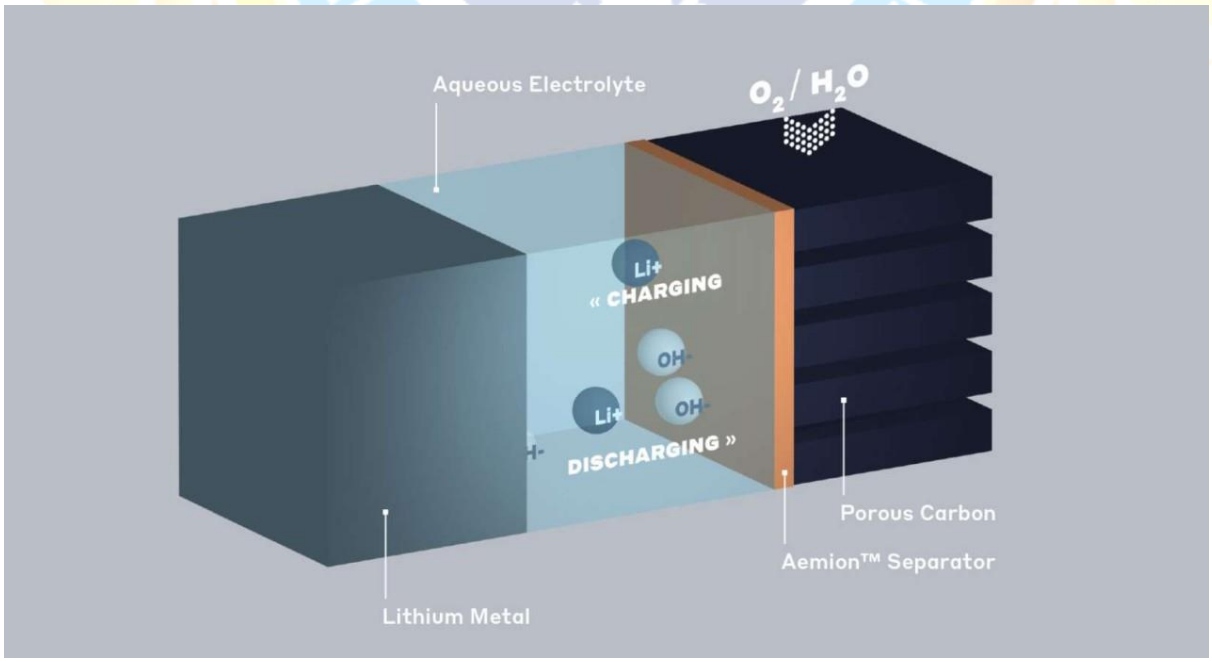
News: *A newly developed device featuring an efficient and durable cathode catalyst, along with an anti-**freezing electrolyte, is designed for zinc-air batteries.**This innovation can serve as a reliable energy source in remote regions like the Himalayas, where conventional batteries often fail due to extreme cold conditions.*

What's in the news?

- In an era of escalating energy demands, **efficient energy storage systems** are pivotal for harnessing clean, renewable resources.
- Researchers are trying to **develop devices with heightened energy density** and reduced weight.
- **Lithium-ion (Li-ion) batteries** face constraints due to heavy cathode materials like lithium cobalt oxide and lithium iron phosphate with limiting energy density.

About Metal-Air Batteries:

- Metal-air batteries are a new kind of battery that can store a lot of energy. They are especially useful for electric vehicles (EVs) and renewable energy sources. These batteries use oxygen from the air, which helps them be **lighter and more efficient**.
- Metal-air batteries are exciting new types of batteries that can use lighter metals like **lithium, sodium, potassium, magnesium, aluminum, zinc, and iron** instead of heavy materials.
    - They work by using oxygen from the **air to help produce energy**, which can make them much more powerful.
- These batteries are **important for finding better energy solutions** that are good for the environment.



- **Methods like splitting water, fuel cells, and metal-air batteries** can provide energy with a low carbon footprint, meaning they are cleaner and cause less pollution.

- **Lithium-Air Batteries (Li-Air):**
    - They have a **high energy density** and are lightweight.
    - However, lithium can be unstable and sensitive to moisture, which makes them tricky to use.
- **Zinc-Air Batteries (Zn-Air):**
    - Made from zinc, which is **common and cheap,** these batteries are safe to use and have a higher energy density than regular batteries.
    - They can have issues with recharging and forming dendrites (**tiny growths that can cause problems).**
- **Aluminum-Air Batteries (Al-Air):**
    - These batteries **have high energy density and use aluminum**, which is abundant and environmentally friendly.

They can have corrosion issues and produce hydrogen gas, which needs careful handling.

Applications of Metal-Air Batteries

- **Electric Vehicles (EVs):** These batteries can help electric cars go longer distances, making them a good alternative to regular batteries.
- **Grid Energy Storage:** They are great for **storing energy from renewable sources** like solar and wind power.
- **Portable Electronics:** Their **lightweight and powerful nature** could change how we use portable devices, allowing for longer usage times.

Government Initiatives

- The Government of India has launched a scheme called the Production Linked Incentive (PLI) Scheme for Advanced Chemistry Cell (ACC) Battery Storage. This scheme aims to promote the production of advanced batteries, including metal-air technologies. It helps make India self-reliant in battery manufacturing and reduces dependence on imports.

Source: https://energy.economictimes.indiatimes.com/news/renewable/dst-researchers-develop-durable-efficient-battery-for-energy-solutions-in-remote-sub-zero-conditions/112188733