

Aluminium air batteries

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In news : Minister of Petroleum and Natural Gas & Steel, along with Minister of Energy, Israel, witnessed the launching of Joint Venture between Indian Oil Corporation Limited and Phinergy, an Israeli start-up company specializing in hybrid lithium-ion and aluminium-air/zinc-air battery systems.

Key updates

- **Aim:** This Joint Venture to boost India's e-Mobility aspirations
- Based on domestically available aluminum, the joint venture plans to manufacture Aluminum-Air systems in India.
- Under this technology, recycling of used Aluminum will help India in becoming "Atma Nirbhar" for energy requirements.
- The new Indo-Israeli JV also intends to develop fuel cells and indigenous hydrogen storage solutions for promoting green mobility.
- This collaboration was initiated during the visit of Shri Narendra Modi, the Prime Minister of India to Israel in July 2017
- In a significant boost to India's pursuit of e-mobility, the two of the leading Automotive manufacturers in India, Maruti Suzuki and Ashok Leyland, signed Letters of Intent (LOI) with the newly incorporated JV IOC Phinergy Limited during the ceremony.

About Aluminium air batteries

- These batteries **produce electricity from the reaction of oxygen in the air with aluminium.**
- **Al-air battery is composed of an air cathode, and aluminium anode and an electrolyte between them**
- They have one of the highest energy densities of all

batteries, but they are not widely used because of problems with high anode cost and byproduct removal when using traditional electrolytes

- Aluminium–air batteries are primary cells, i.e., non-rechargeable.
- Once the aluminium anode is consumed by its reaction with atmospheric oxygen at a cathode immersed in a water-based electrolyte to form hydrated aluminium oxide, the battery will no longer produce electricity.
- However, it is possible to mechanically recharge the battery with new aluminium anodes made from recycling the hydrated aluminium oxide.
- Such recycling would be essential if aluminium–air batteries were to be widely adopted.

How does it work?

- The aluminum-air battery consists of an aluminum anode in an electrolyte solution of potassium hydroxide and uses oxygen from air as the cathode.
- A selectively permeable membrane allows oxygen from the air to enter the cell but excludes gases such as carbon dioxide that would interfere with the battery's function.
- When the battery is in use, the oxidation reaction of aluminum plus oxygen plus water produces aluminum hydroxide plus electrical energy

Its advantages with respect to electric vehicles

- An electric vehicle with aluminium batteries has the potential for up to eight times the range of a lithium-ion battery with a significantly lower total weight.
- These batteries not have the necessity to electrically charge the batteries, unlike Lithium-ion variants
- The proven range in India of any variant of Lithium-ion battery is between 150-200 km/charge, but Aluminium-air batteries even on a modest expectation run more than 400

km/charge