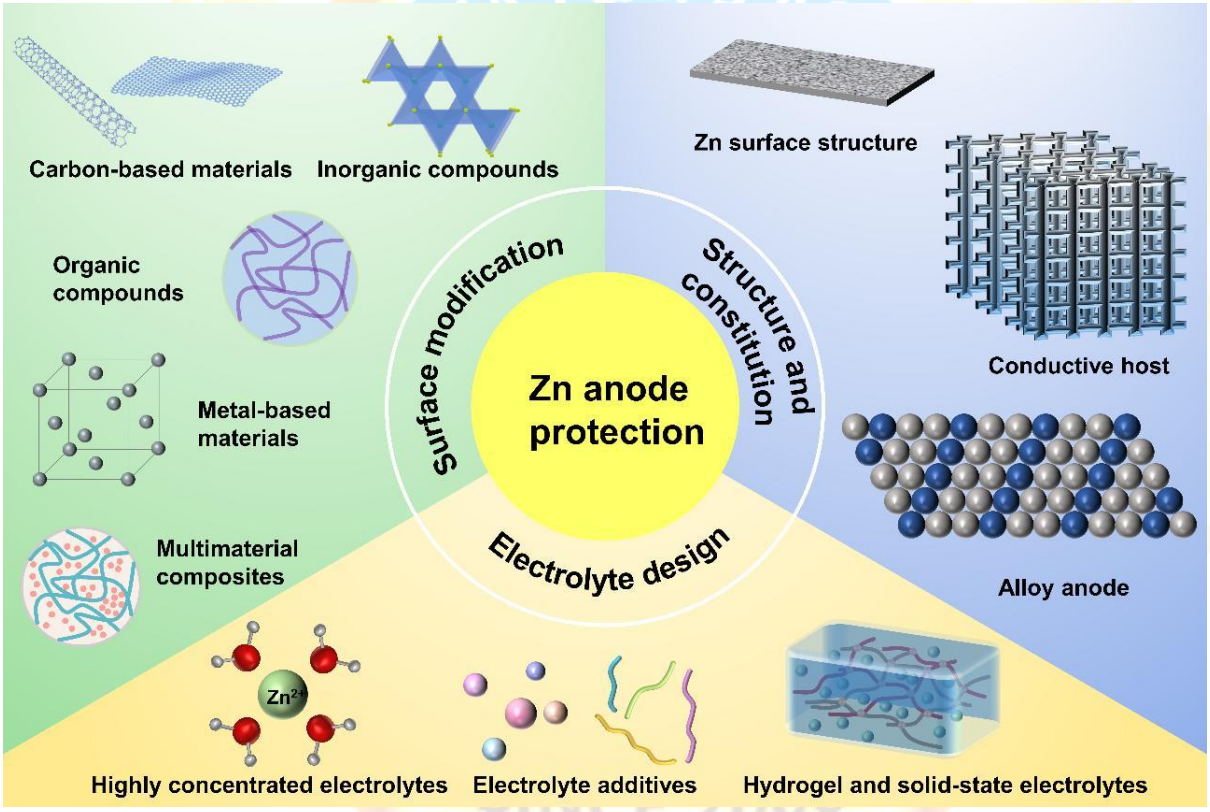
ZINC ION BATTERIES – SCIENCE & TECHNOLOGY

News: Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) has partnered with Hindustan Zinc Limited (HZL) to develop and commercialize new zinc materials for low-cost, grid-scale energy storage using indigenous Zn-ion battery technologies.

What's in the news?

About Zinc Ion Batteries

- Zinc ion batteries utilize zinc as the **primary material for the anode**, and a material like manganese **dioxide or vanadium oxide** is used for the cathode.
- The **electrolyte usually comprises an aqueous solution**, which is different from the organic solvents used in lithium-ion batteries.
- This **simple composition** offers several advantages over traditional lithium-ion batteries.



Advantages of Zinc Ion Batteries

Safety and Stability:

- Zinc ion batteries are inherently **safer than lithium-ion batteries.** They are less prone to catching fire and do not pose significant risks of explosion, making them suitable for various applications, including large-scale energy storage.

Cost-Effectiveness:

- **Zinc is abundant and relatively inexpensive compared to lithium**. This makes zinc ion batteries more cost-effective to produce, which can lower the overall cost of energy storage solutions.

Environmental Impact:

- **Zinc ion batteries are more environmentally friendly**. The materials used are non-toxic and pose minimal environmental hazards. Moreover, the aqueous electrolytes used reduce the risk of chemical leaks and pollution.

High Performance:

- These batteries exhibit good performance in terms of energy density and cycle life. They can **efficiently store and deliver energy, making them viable for both small-scale electronic devices and large-scale energy storage systems.**

Research and Developments in India

- Recent advancements in zinc ion battery technology in India have shown promising results.
- **Researchers are focusing on improving the energy density** and cycle life of these batteries to make them competitive with lithium-ion batteries.
- **India's push towards renewable energy** and sustainable practices has further accelerated research in this area.

Applications of Zinc Ion Batteries

Grid Storage:

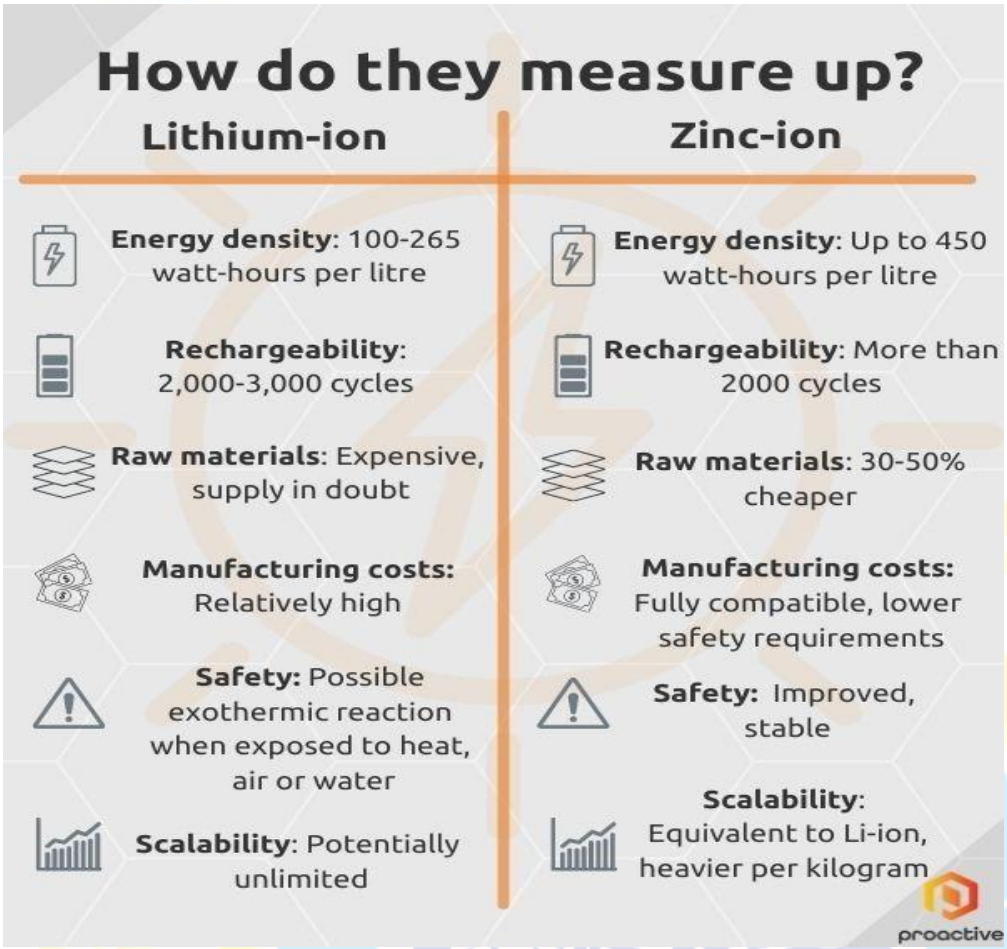
- Zinc ion batteries are **well-suited for grid storage applications**.
- Their safety and cost advantages make them ideal for storing renewable energy from sources like **solar and wind, ensuring a stable energy supply.**

Electric Vehicles (EVs):

- While still in the development phase, zinc ion batteries have the potential to be used in electric vehicles.
- **Their safety, coupled with improvements in energy density**, could make them a viable alternative to lithium-ion batteries for EVs.

Portable Electronics:

These batteries can also be used in portable electronic devices, offering a safer and potentially **longer-lasting power source.**



Future Prospects

- The increasing emphasis on sustainable energy storage solutions provides a robust platform for the development and adoption of zinc ion batteries.
- As research progresses, these batteries are expected to play a significant role in the energy storage landscape, contributing to the global shift towards green energy.

Conclusion

- Zinc ion batteries represent a promising **advancement in energy storage technology**.
- Their safety, cost-effectiveness, and environmental benefits make them a viable alternative to lithium-ion batteries.
- With **continuous research and development**, zinc ion batteries have the potential to revolutionize energy storage systems and support sustainable energy initiatives globally.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=2047647