

## Electrically Rechargeable Zinc-Air Battery

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Zinc air batteries use very cheap raw materials (Zinc, Carbon, Potassium Hydroxide) with material cost less than 10€/kWh and are potentially very low cost batteries. They use environmentally benign materials and are very safe. Because they use an aqueous electrolyte and because the positive electrode active mater is not stored in the battery, there is no possibility of thermal runaway or fire. Zinc-air batteries are therefore an interesting option for the electric vehicle.

High energy density zinc-air batteries are already on the market with energy densities above 400 Wh/kg but they are not rechargeable. Mechanically rechargeable zinc-air batteries have also been proposed but this option is not compatible with the requirements of the electric vehicle as it involves opening the battery to replace the caustic aqueous electrolyte and inserting new zinc electrodes, a process which can only be performed in specialised stations and not at home. There is also a risk of electrolyte spillage and corrosion during this process.

The electrically rechargeable zinc air battery is the ideal solution for the electric vehicle but attempts to develop such a battery have failed due to the poor reversibility of the air electrode and due to the formation of zinc dendrites during charge. EDF and its partners have developed an electrically rechargeable zinc-air battery which has solved these problems and which has high cycle efficiencies. The cycling behaviour of the electrically rechargeable zinc-air cells will be discussed, both in low and high power mode.