Nickel Metal Hydride Battery:Introducing an Eco-FriendlyInnovation for Energy Storageaa

Nickel Metal Hydride Battery

The nickel metal hydride (NiMH) battery is a type ofrechargeable battery similar to the nickel–cadmium battery, but usinghydrogen-absorbing alloysfor the anode instead of cadmium. Compared to NiCdbatteries, NiMH batteries have higher energy densities, no memory effect, and lessself-discharge.

Chemistry of NiMH Battery

Nickel Metal Hydride Battery, the anode is made up of a hydrogen-absorbing alloy typically made from rare earth metals such as lanthanum, cerium, praseodymium, or mischmetal. During discharge, hydrogen is released from the anode alloy and combines with oxygen from the cathode material to form water. The cathode is typically made from nickel oxyhydroxide (NiOOH). At the anode, the reaction is:

$MH + H_2O ? M + H_2 + OH^-$

While at the cathode, the reaction is:

$NiOOH + H_2O + e^- ? Ni(OH)_2 + OH^-$

The overall cell reaction is:

$MH + NiOOH ? M + Ni(OH)_2$

Advantages of NiMH Batteries

Some key advantages of NiMH batteries include:

– Higher Energy Density: NiMH batteries can store up to twice as much energy perunit weight as comparable NiCad batteries. This allows devices to operatelonger on a single charge.

– No Memory Effect: Unlike NiCad batteries which exhibit a “memory effect”, NiMH batteries do not need to be fully discharged before recharging. Partial discharges do not degrade the capacity.

– Less Self-Discharge: NiMH batteries have a self-discharge rate of around 10% per month as compared to 25-30% for NiCad batteries. This results in a longer shelf life.

– More Environment Friendly: NiMH