Sanyo Eneloop Technical Information

For the first time in battery-history it has been possible to combine the advantages of rechargeable batteries with the advantages of disposable batteries. This new kind of battery was developed by SANYO, the worldwide leader in rechargeable batteries in 2005, and was launched in the European market in 2006. Since then it has been the most successful new battery ever put on the market.

Historically disposable and rechargeable batteries had their individual advantages which were impossible to combine.

Disposable batteries could be used immediately out of the package and could be stored for months or even years without having to consider their self discharge. Their ease of use was unbeatable, and basically they could be used everywhere. However, once empty they had to be thrown away and a new battery had to be purchased.

Rechargeable batteries had the major advantage, they could be used more than once. By re-charging, the use of one battery could be multiplied.
This clear advantage however was associated with some less appealing aspects. Before usage they had to be charged, and once charged they lost their energy rather quickly, so frequent re-charging or charging just before usage was necessary.

How was the self-discharge reduced?
Modern Ni-MH batteries consist of two metal stripes (anode and cathode), which are separated by a non-conductive porous plastic foil (separator). These three stripes are laid on top of each other and are wound to a coil. This coil is put in a metal can and immersed with a liquid (electrolyte). Then the metal can is closed with a cap.

The self discharge of Ni-MH batteries is caused by three main reasons:
the chemical decomposition of the cathode,
the natural disaggregation of the anode,
Impurities of the anode.

Now, how could the self-discharge in the eneloop been reduced?

The chemical decomposition of the cathode has been reduced substantially by the use of a new superlattice alloy.
As an additional benefit the superlattice alloy increases the electrical capacity of the battery and reduces the internal resistance, which allows higher discharge currents.
Another advantage of the super-lattice alloy is that less cobalt is needed to stabilize the compounds' structure.
The anode has been strengthened by another new material, which reduces the natural disaggregation.
Additionally the separator and the used electrolyte have been optimised for low self discharge of the eneloop.

A detailed description of the technology can be found in this article.
Which changes have been made for the new eneloop?
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The technological difference between the "old" and the "new" eneloop is, that the super-lattice-alloy of the "new" eneloop has been even more improved.
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(1) Advanced materials: Development of a highly-durable super-lattice alloy
The durability of SANYO’s original super-lattice alloy, a negative-electrode material used in eneloop, has been enhanced by homogenizing the crystalline structure (a reduction of crystals with an irregular atomic order is irregular) as well as improving its composition (the ratio of constituent element) to reduce the deterioration of the super-lattice alloy by repeated charge and discharge.

(2)Advanced manufacturing method: Developed technology to protect the surface of the super-lattice alloy
A new additive to the negative electrode material, super-lattice alloy, and a new additive coating technology was developed. By protecting the alloy surface, deterioration of the super-lattice alloy by repeated use can be reduced.

(3) Advanced structure: Use of strong/thin outer case
The new eneloop adopts the same strong/thin outer case used for SANYO’s industry-leading level high-capacity AA-size rechargeable

batteries, the Ni-MH2700 Series. This improves the internal cell space efficiency and optimizes the balance of battery components, leading to an increase in the number of times a battery can be recharged.