

World's first commercialization of Mercury-Free Silver Oxide Battery



[Sony Corporation](#) today announced the accomplishment of **the world's first Mercury-free silver oxide battery**, which was considered difficult within the industry. Starting January 2005, 10 models of mercury-free batteries will be commercialized on a world-wide basis.

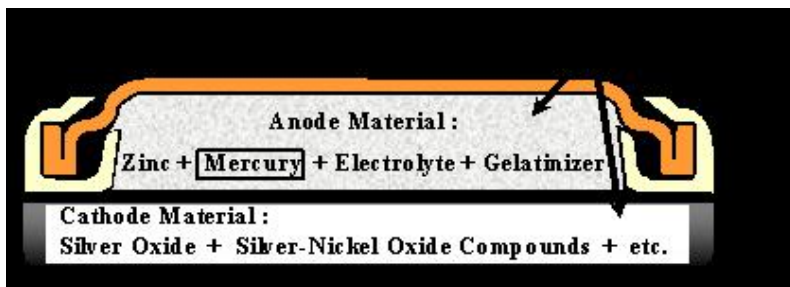


Fig. 1. Schematic Diagram of Silver Oxide Battery Cell

Sony is producing Silver Oxide batteries of all sizes and currently Sony has the top market share. Silver Oxide battery is mainly used for wrist watches, small-size thermometers and mobile game products. Sony started its Silver Oxide battery business in 1977 and, as of September this year (2004), Sony has realized in producing 5 billion cells of Silver Oxide battery cumulatively.

The mercury-freeing technology development announced this time will very much influence the increasing interest of the effect that mercury incorporate in batteries has on environmental issues. Currently, revisions in the battery directives are being made in the European Parliament and European Environmental Council, however it is expected that freeing mercury from silver oxide batteries will be an exception, due to the difficulty in realizing it. However, the new Sony's 0% mercury silver oxide battery made this possible.

Annually, Sony sells approx. 400 Million Silver Oxide batteries worldwide, and considering the fact that the mercury level of Sony's silver oxide batteries is 0.2% of the total content of a battery, making them mercury-free will lead to reducing the annual usage of mercury by 320 kg, which dramatically contribute to protecting the environment.

Also, in the European battery directives, the determinations on the regulation of the level of lead is also under discussion (i.e. to be less than 40ppm), and it should be emphasized that in Sony Mercury-free silver oxide batteries usage of lead has also been eliminated.

The function of Mercury in Silver Oxide Battery

Silver Oxide battery is a small-sized primary battery using Zinc as the negative electrode (anode), Silver Oxide as the positive electrode (cathode) plus an alkaline electrolyte (Fig. 1).

Zinc which is the activator in the negative electrode will corrode in alkaline solution and it is consumed. When this happens, it becomes difficult to maintain the capacity of the unused battery. This corrosion of Zinc also causes electrolysis in the electrolyte and brings about the production of Hydrogen gas, which will result in ascent of inner pressure and expansion of the cell. And for this reason, mercury which suppressed the corrosion of Zinc was added in the battery, however it was desired for mercury to be reduced, for its considerable harm to the environment.

Counter measures to realizing a Mercury-free Silver Oxide Battery

With the below explained three technical countermeasures, Sony has succeeded in preventing the Zinc corrosion (i.e. Hydrogen gas generation), which is indispensable for the achievement of Mercury-free Silver Oxide battery.

1. Adoption of high quality Zinc alloy powder with improved corrosion resistance

By optimizing the mixed ratio of fine metal used (i.e. Zinc-alloy powder), it has been managed to dramatically reduce the corrosion rate, 10 times less, compared to conventional material.

2. Addition of anti-corrosion material into anode materials

This additive can prevent the generation of Hydrogen gas by blocking the gas-generation spots. This leads to reducing the corrosion rate by a half, thus reducing the Hydrogen gas generation dramatically.

3. Adoption of anti-corrosion technology to the collector materials

Suppressing the corrosion of the collector electrode has an effect of suppressing the corrosion of Zinc as well, however on the other hand, if not processed properly, it caused leakage of the inner electrolyte. Using Sony's unique technology used in electronic device manufacturing, which is to do with surface process technology, Sony has managed in enhancing the accuracy of processing, succeeding to achieve anti-corrosion and to prevent liquid leakage at the same time.

Additionally, a Sony-unique active cathode material, which Sony has adopted from its current cells, has high hydrogen absorption capacity, resulting in the maintenance of a safe cell. (i.e. problem of cell expansion caused by hydrogen gas is solved). In addition, as a typical evaluation parameter of batteries, it has been achieved to improve the battery conservation capabilities as well.

As for the patents related to the development of mercury-free silver oxide batteries, applications of 5 patents have already been made in Japan, USA and Europe.

Sony will target to eliminate mercury from all Silver Oxide battery cells and will continue to pursue the advancement of environment-conscious technology.

Source: Sony Corp.

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