

# Long-Lasting Mobile Devices Thanks to Rhodium

Although most mobile devices are already designed for significantly longer life cycles, corroding charging contacts and connectors make the otherwise intact device suddenly unusable. A rhodium/ruthenium alloy now gives the contacts unprecedented corrosion resistance.



By plating the contacts with the rhodium/ruthenium alloy, the base material of the contacts is protected both on the device and on the connector. Thus, the charging process remains safe and the continuity of functionalities such as fast data transfer is guaranteed.

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The initially rapid development of mobile phones, tablets, wireless headphones or smart fitness bracelets is increasingly slowing down. Performance, design and usability have now often become interchangeable across brands. As a result, even marginal price differences and sustainability are coming to the fore. For the consumer, the term sustainability does not necessarily go hand in hand with the often associated environmental considerations - it is rather the expectation of a durable product that can be used at any time without hesitation.

This cannot be achieved with the previous standard, gold-plated charging contacts and connectors. Wearables in particular are by nature not used in an environment protected from the outside world and are therefore exposed to galvanic corrosion conditions. Particularly during leisure activities, the devices often inevitably come into contact with chloride-containing liq-

uids such as skin sweat, swimming pool as well as sea water or even beverages. Of course, most of the devices are at least splash-proof and give the impression that they have not been affected. However, the danger is not in the immediate functionality but in the medium term at the open contacts: in connection with chloride-containing solutions, gold-plated contacts inevitably corrode during the charging process at high speed.

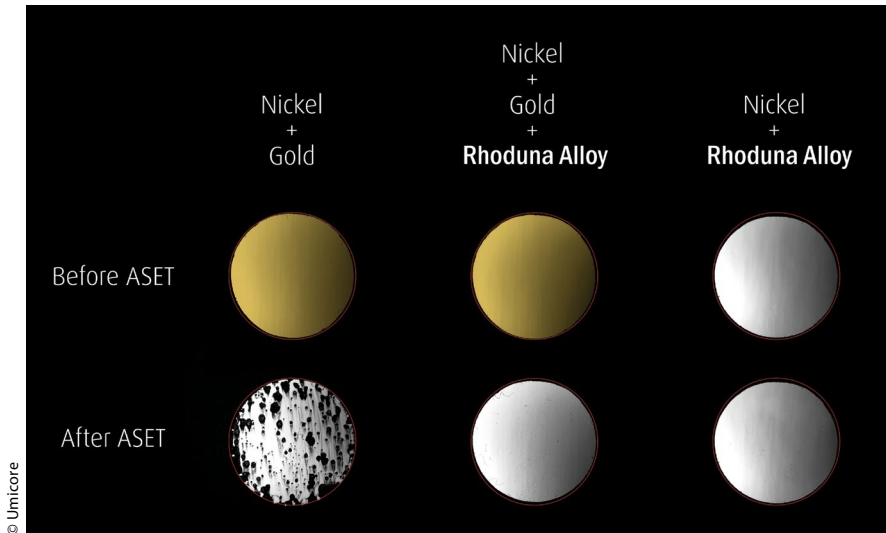
## Gold versus rhodium

This is where Umicore Electroplating's rhodium-ruthenium electrolyte Rhoduna Alloy comes in: The alloy, which can be plated by means of metal-saving electroplating processes using proven continuous mass production equipment, gives contacts a previously unattained corrosion resistance - without affecting features such as fast charging capability.

In an electrochemical corrosion test, a one-percent saline solution (250 ml) is applied to a voltage of 5 V at 40°C. This simulates a complete charge cycle in 30 seconds for contacts contaminated with sweat. After only 2.5 minutes the 0.75 µm gold layer, which is usual for contacts, has completely dissolved and the nickel substrate is already heavily corroded. In contrast, no corrosion can be detected in the rhodium/ruthenium alloy under polarised light at 20× magnification. The chemically almost inert final layer has a very low porosity and the entire system thus has excellent corrosion resistance.

## Sustainability brings economic efficiency

The electrolyte is a benefit for all parties involved. The consumer is pleased about a longer lifetime and thus sustainability of his mobile device. The producer wins



Result of the electrochemical ASET (Artificial Sweat Electrolysis Test): After just over 2 minutes the gold layer is dissolved and the nickel layer is corroded. The rhodium/ruthenium alloy on the other hand remains stable.



Contacts of a fitness bracelet after the charging process. The left contact, previously contaminated with sweat solution, shows a clear corrosion of the gold layer in comparison to the right contact, which was not contaminated.

in two ways: on the one hand, the product reliability gained is positive for the image of the manufacturer. On the other hand, the overall costing is significantly more economical – despite the investment for the alloy being four times higher than for the gold layer.

While it is difficult to measure the savings resulting from the image gain and the supposedly higher sales volume only has an effect in the medium term, the savings in claims due to corroded contacts can be clearly and immediately quantified. Costs for correspondence, logistics and, of course, for the repair or exchange of defective devices are eliminated without replacement. //

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