

[Top 3 place at the Stuttgart Surface Technology Prize 2020 of the Fraunhofer Institute for Manufacturing Engineering and Automation IPA for Umicore Electroplating](#)

RHODUNA® ALLOY BRINGS LONG DESIRED CORROSION RESISTANCE AND THUS DURABILITY FOR MOBILE DEVICES

Although most mobile end devices are designed for significantly longer life cycles, these are often not achieved by their necessary connection to the outside of the device. Corroding charging contacts and connectors for short charging times or fast data transfer make the otherwise intact device suddenly unusable. Resulting complaints from end customers lead to image damage and often unforeseen costs on the manufacturer's side, which in the medium term result in an increased and therefore less attractive product price.

With RHODUNA® Alloy, Umicore Electroplating has created a rhodium-ruthenium electrolyte that addresses precisely this problem. 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.

GOLD-PLATED CONTACTS CAN NO LONGER MEET THE INCREASED EXPECTATIONS

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.

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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 liquids 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.

CORROSION TEST PROVES THE SUPERIORITY OF THE NEW ALLOY AFTER ONLY A FEW MINUTES

In an electrochemical corrosion test, a one-percent saline solution (250ml) is applied to a voltage of 5V 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 RHODUNA® Alloy under polarised light at 20x magnification. "The chemically almost inert final layer has a very low porosity and the entire system thus has excellent corrosion resistance," Martin Stegmaier (Division Manager Decorative Applications) confirms the previously unattained layer characteristics.

SURFACE TECHNOLOGY PRIZE 2020 CONFIRMS INNOVATIVE CHARACTER OF RHODUNA® ALLOY

With RHODUNA® Alloy, Umicore Electroplating has earned a top position at the Stuttgart Surface Technology Prize, which is awarded every two years by the world-renowned Fraunhofer Institute for Manufactur-

ing Engineering and Automation IPA. Dr. Ing. Martin Metzner, head of the department for electroplating, explains the 3rd place with a simple fact: "The Umicore ... has succeeded ... in countering the complex and often adverse influences to which the contacts of mobile devices are exposed". Uwe Manz (Head of Research & Development) is especially pleased with the award for one reason in particular: "Of course, commercial success shows that we develop the right products for the various markets. But the award also confirms that we are still at the forefront in terms of the degree of innovation, sustainability, enabler qualities and industrial feasibility - the criteria according to which the prize was awarded.

SUSTAINABILITY BRINGS PROFITABILITY

RHODUNA® Alloy 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 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 thanks to RHODUNA® Alloy - 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.

HIGH QUALITY ALSO IN TECHNICAL SALES OFFERS A COMPLETE BASIS FOR DECISION-MAKING

The Umicore sales team takes away the fear of changing a functioning process right from the first meeting with the presentation of the on-boarding roadmap. Before any possible introduction or changeover to RHODUNA® Alloy, an extremely detailed query of the previous pro-

cess environment is carried out. According to their own statements, this ensures a smooth productive start and, in the worst case, prevents production downtimes.

The company's non-binding service does not end here. "We are aware that the prospective customer needs a complete basis for decision making, which goes far beyond individual price calculation, product samples and, if necessary, optimisation tips for an optimal process landscape. That's why test production in the customer's environment is also part of this for us", Markus Legeler (Head of International Sales) describes the on-boarding for customers and adds: "Of course, due to the current circumstances, we can, on request, completely virtually map all steps from consultation to setup and staff training to continuous production support".

SOURCES AND MORE INFORMATION ONLINE:

- <https://ep.umicore.com/en/products/productfinder/rhoduna-alloy-1-technical-rhodium-ruthenium-electrolyte/>
- <https://ep.umicore.com/en/information/time-for-substitution/>
- <https://www.ipa.fraunhofer.de/de/presse/presseinformationen/die-sieger-stehen-fest.html>

IMAGES

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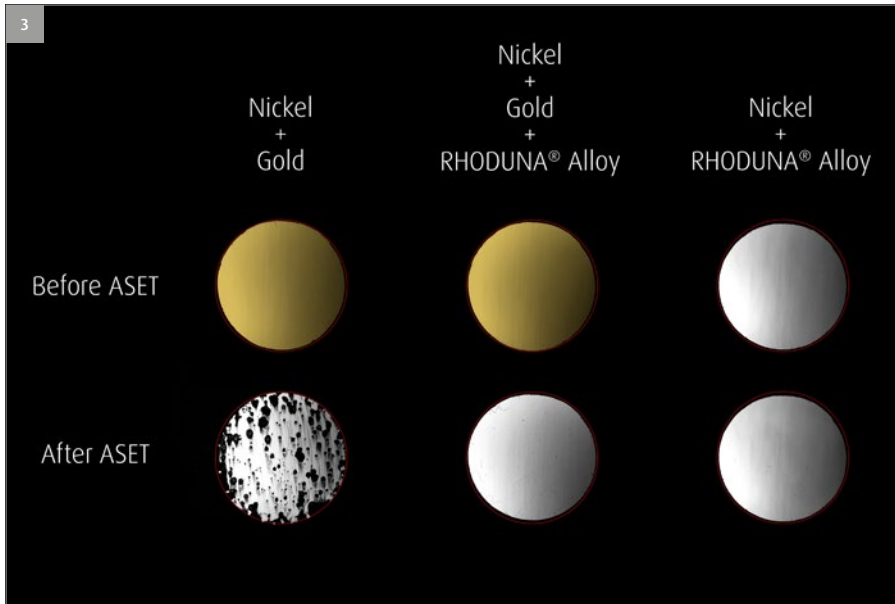
RHODUNA® Alloy was originally developed for the decorative sector and has been established over the years. The further development now continues the success story also for technical applications.

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With RHODUNA® Alloy, Umicore Electroplating has won 3rd place in the Stuttgart Surface Technology Prize 2020 of the Fraunhofer Institute for Manufacturing Engineering and Automation IPA, which is awarded every two years on the basis of the criteria degree of innovation, sustainability, enabler qualities and industrial feasibility.

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In the electrochemical ASET (Artificial Sweat Electrolysis Test), the corrosion resistance of RHODUNA® Alloy is shown compared to the previous standard gold. 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.

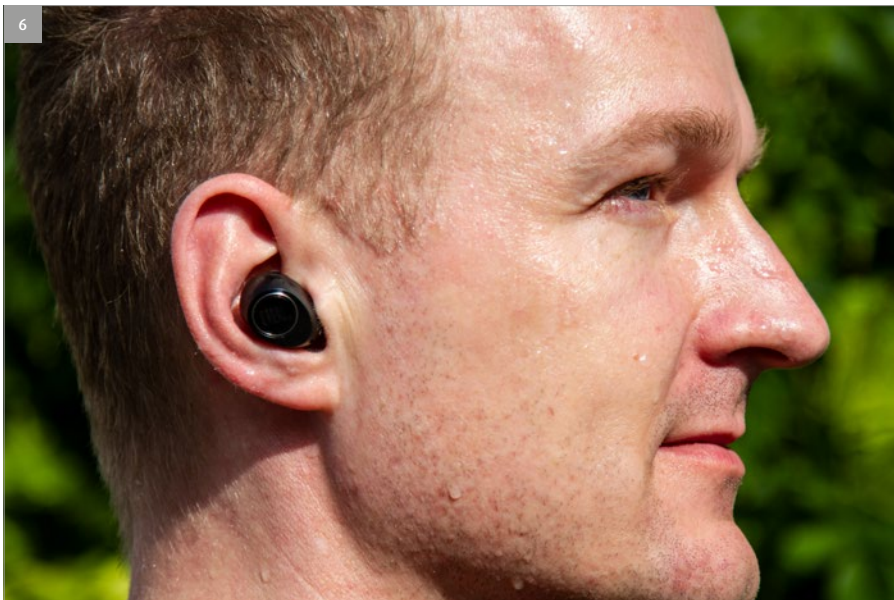


Contacts of a fitness bracelet after the charging process. The left contact, previously contaminated with sweat solution, shows a clear corrosion of the gold layer in comparison to the right contact, which was not contaminated. However, contamination with chloride-containing solutions, such as sweat or sea water, is not unusual during normal use of mobile devices.

IMAGES



By coating the contacts with RHODUNA® 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.



Wearables such as wireless headphones are no longer rechargeable after corrosion of the contacts has progressed and are therefore unusable. If the contacts are coated with RHODUNA® Alloy, they are protected against corrosion. This does not affect the ability to charge the device quickly.

IMAGES



Martin Stegmaier
Division Manager Decorative Applications



Uwe Manz
Head of Research & Development

IMAGES



Markus Legeler
Head of International Sales



Logo
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ABOUT UMICORE

Within the Umicore Group, Umicore Electroplating is responsible for product development, production, sales and service coordination in around 60 countries.

The company boasts a long history in Schwaebisch Gmuend reaching back to 1888. Founded as a precious metals refinery, the company is now a globally leading company in precious metal electroplating. Umicore Electroplating is a wholly owned subsidiary of Allgemeine Gold- und Silberscheideanstalt AG, Pforzheim, whose majority owner is the Umicore Group.

Electroplating is currently referred to as a cross-sectional technology, as it is used on many all everyday products and/or facilitates their production. Almost all renowned producers in the communications, automotive and jewellery industries directly or indirectly use items that have been plated using Umicore products from Schwaebisch Gmuend. Umicore Electroplating operates and enjoys a leading position in a special niche area defined by precious metal-based plating combinations.

More information: www.ep.umicore.com

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