

1 *Stainless steel surface, with hybrid polymer ORMOCER® coating on the left-hand side: water beads simply roll off and fingerprints are barely visible in contrast to the uncoated right-hand side.*

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FUNCTIONAL COATINGS FOR METAL SURFACES

Metals are usually coated in order to protect them from corrosion out of economic or business considerations. Technical components and products often require a coating in order to ensure their quality and reliability. Coatings may further provide metal surfaces with additional functions to make them dirt-repellent, scratch resistant or resistant to abrasion.

High-gloss stainless steel surfaces, e. g., are very sensitive when it comes to fingerprints, contamination or scratches. Precious metals like silver and gold oxidize easily – they tarnish – and constant care must be taken to maintain the gloss.

A transparent abrasion-resistant anti-adhesion coating not only increases corrosion resistance but also reduces maintenance and cleaning requirements. Also, color systems may be applied as full-area decorative layers or labels.

Suitable Coating Materials

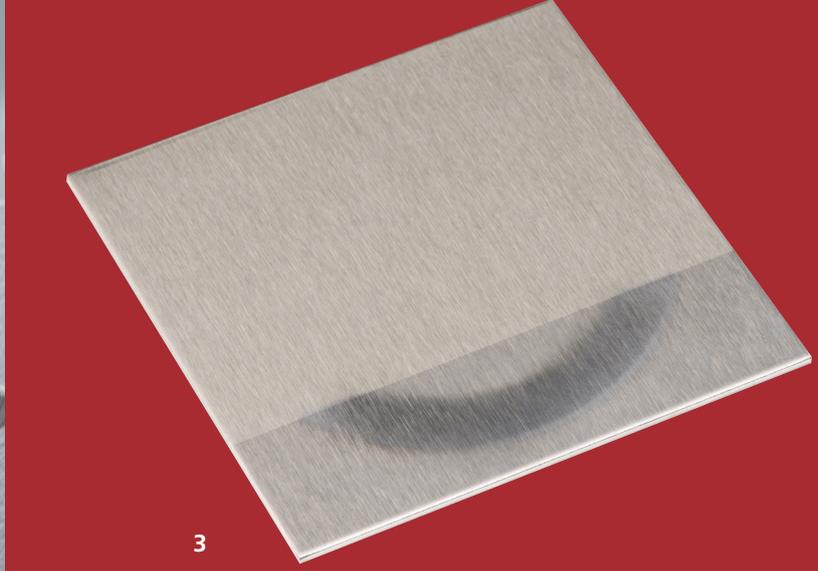
ORMOCER®s developed at the Fraunhofer ISC are a most promising material for a great number of applications in metal coating. These hybrid polymers, which are synthesized via the wet-chemical route, can be applied onto the metal surface by conventional coating procedures. By variation of their chemistry and individual processing parameters, they can be tailored to meet the specific requirements of each target application.

Protective Coatings

Optimum adhesion to the metal surface is indispensable for effective corrosion protection. Alkoxy and hydroxy remnants, respectively, contained within the ORMOCER®s are reacted with OH groups on the metal surface. This provides for optimum adhesion conditions.



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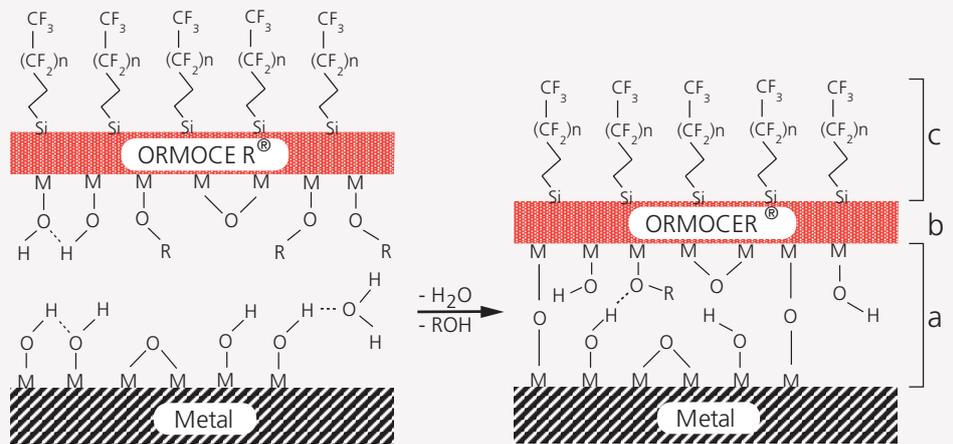
Compared to purely organic coatings, ORMOCER® layers are harder and abrasion resistant.

Easy-to-clean and decorative

Metal surfaces can be provided with additional repellent properties through perfluoroalkyl alkoxy silanes.

To achieve transparent, translucent or opaque color coatings, selected dyes or pigments can be incorporated into the ORMOCER® matrix. There is virtually no limit to the number of possible shades and the degree of color intensity.

Schematic drawing of how colored ORMOCER® coatings (b) adhere to the metal surface (a) and can be equipped with repellent properties through perfluoroalkyl alkoxy silanes (c).



Properties and benefits

- aqueous, alcoholic sols
- solids content: 30 – 40 %
- viscosity: 10 – 20 mPa·s
 - to be applied by conventional wet-coating techniques
 - low curing temperature (<200 °C)
- low surface energy of coating containing perfluor silane: 13 mN/m (as reference: stainless steel = 45 mN/m and teflon = 18,5 mN/m)
 - surface easy to clean
- good adhesion
- good abrasion resistance
- additional decorative color effects possible, including color gradients and partial coloration

Range of application

- Easy-to-clean finish for stainless steel products providing repellent properties
- Antitarnish properties for precious metal products without any impact on their optical appearance
- Corrosion protection for metallized glass surfaces
- Abrasion protection for aluminum and non-ferrous metal surfaces

2 Copper newspaper holder, half coated – the effect of the oxidation protection of the hybrid polymer coating is clearly visible on the right-hand side.

3 Aluminum sheet after Taber-Abraser testing: The coated top half shows good protection against abrasion.