1 *scratch resistant protection coatings for plastic surfaces*

2 *CO_2 sensitive protection coating for optical sensor fibers*

3 environment-friendly oil, grease and water migration barriers for polymer films

Fraunhofer-Institut for Silicate Research ISC

Neunerplatz 2
97082 Würzburg
Germany

Contact

Dr. Klaus Rose
Phone +49 931 4100-626
klaus.rose@isc.fraunhofer.de

www.isc.fraunhofer.de

UV CURABLE ORMOCER® COATINGS

Coatings can provide surface functionalites or optimize product porperties with just a minimum amount of extra materials and therefore are the ideal way for manufacturers to increase their added value for the benefit of consumers and end users alike.

For sensitive substrates, Fraunhofer ISC offers special wet-chemical coating systems on the basis of hybrid polymer nanocomposites – so-called ORMOCER®s. These are UV curable and thus eliminate vacuum or thermal post-treatment processes.

The ORMOCER® coatings can be applied by conventional methods such as dip, spray or spin coating and are equally suitable for batch or continuous processing at rates of up to 300 m/min (on paper or film in roll-to-roll processes as well as for fiber processing). They can also be adapted for structural application e.g. by inkjet or screen printing or other imprint procedures.

Owing to the wide variety of possible compositions for hybrid polymers, ORMOCER® coated substrates can be tailored to offer almost any functional property for target applications.

Typical applications

- scratch resistant functional coatings for plastic surfaces
- flexible gas sensitive or protection coatings for fibers and optical fiber sensors
- environment-friendly barrier coatings for paper and polymers to protect them from oil, grease or water migration
- UV adhesives
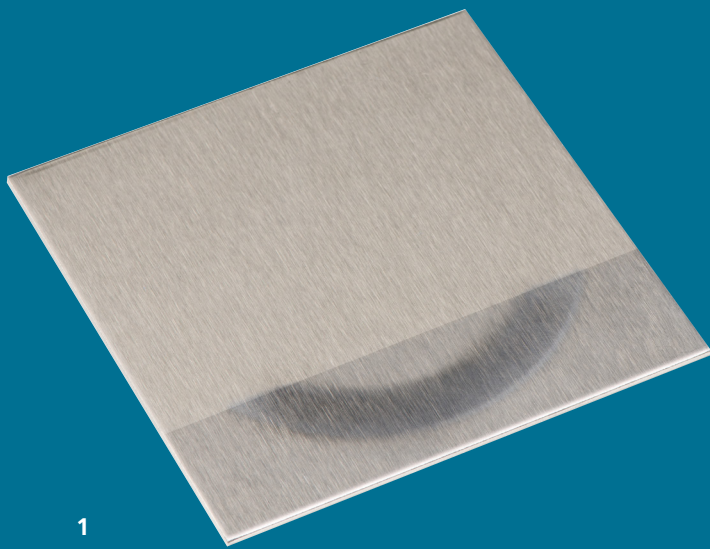
Coating solution

- solvent based in low boiling alcohols and esters (solids content 20 - 50 %)
- solvent reduced / solvent free resins (solids content 80 - 95 %)
- viscosity 2 - 15.000 mPa·s – depending on coating process
- easy to apply by conventional methods: spraying, dipping, spin coating, flow coating, roll coating or printing methods

General features

- incorporation of standard additives: dyes, pigments, UV stabilizers
- easy-to-clean effect, hydrophobicity, oleophobicity achievable by creating low surface energy of 10 - 20 mN/m
- mechanical durability, abrasion resistance
- suitable for different substrates : PMMA, PC, PS, ABS, PU, glass etc.
- adhesion promoting by physical and chemical methods possible, if applicable
- recommended UV curing conditions: Hg radiation source (power 100 W/cm), UV dose 0.5 - 5 J/cm^2, curing time 0.5 - 20 sec
- high coating velocity up to 300 m/min
- coating thickness: 3 - 10 µm (lacquers); approx. 20 - 50 µm on optical fibers

Material properties

- micro hardness on plastic: 210 - 420 MPa
- abrasion resistance on plastic 1.5 - 4 % haze
- refractive index: 1.42 - 1.52
- stable against solvents and heat up to 250 °C

Testing and quality control

At Fraunhofer ISC, all standard DIN test procedures are available for in-house testing and characterization. Among the properties to be determined are mechanic abrasion resistance, resistance to light or climate exposure or to weathering as well as adhesion properties. These tests are also among the services offered to external users or developers who would like to make use of the broad spectrum of available test and characterization methods for chemical and surface analyses.

Benefits

Based on the longstanding experitise in the development of coating materials for all kinds of applications and on the profound know-how in the field of materials research, Fraunhofer ISC can support manufacturers in finding the best solution for any problem that may come up with materials or their processing. Fraunhofer ISC can help manufacturs to shorten the time to market and reduce the development risk.

1 Abrasion protection for sensitive surfaces
2 UV curing process