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"TRANSPARENT MESOPOROUS SOL-GEL COATINGS: PREPARATION AND PROPERTIES"

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Dienstag, 19.06.2018, 11.00 Uhr

INM, Leibniz-Saal, Campus D2 5
Gastgeber: Dr. Peter W. de Oliveira

Sol-gel coatings with various functional properties will be the topic of the presentation. The optical and wetting properties of the coatings as well as their photo activity are at the centre of our interest. The talk will consist of three main parts as follows.

1. **Improved light transmittance (silica coatings)**

It will be shown that thin mesoporous silica coatings which are prepared by using micellar templates can significantly increase the light transmittance of transparent substrates (glass and plastic). It will be demonstrated that the region of the transmittance maximum (99-100%) can easily be controlled by the speed of layer deposition during the dip coating process. Additionally, a special sol-gel procedure to improve the transmittance of mesoporous silica coatings on commercial-grade polycarbonate substrates will be described. The conditioning of the layers was carried out at a relatively low temperature (120 °C), thus solvent extraction was needed for the removal of the pore-forming surfactants. Temporal stability of the improved light transmittance was ensured by aging the samples in ammonia vapour. The relatively thin (100-120 nm) coatings kept their maximum transmittance (> 98%) for at least 500 days.

2. **Improved light transmittance and water repellence (hybrid silica coatings)**

Preparation of bifunctional coatings with improved light transmittance and water-repellent properties will be described. These two special features complement each other, e.g., in outdoor applications, because the water-repellent property prevents the adhesion of water drops and other contaminants onto the coatings. To achieve this goal, hybrid silica coatings of non-polar character were prepared on glass substrates by dip coating process. In order to improve the light transmittance

cationic surfactants were used as templates during preparation. Stability tests were carried out to simulate the environmental effects by keeping the samples in acidic (or basic) solutions for different time periods and at different temperatures. After the soaking experiments the stability was assessed by measuring the optical and wetting properties of coatings.

3. Adsorption and photodegradation of Rhodamine 6G molecules in mesoporous titania coatings

Preparation of thin titania coatings with different pore sizes and structures will be described. Rhodamine 6G dye molecules were adsorbed in the pores of dip-coated titania samples and their photodegradation was studied under sensitizing (in visible light) and in non-sensitizing (in UV light) circumstances at the air-solid interface. Dyes adsorbed in the mesoporous coatings in their monomer and associated forms. It was found that dye association in the pores depended on the pore sizes, and had an important role in the photodegradation processes. Associated forms of the investigated dyes showed higher photostability compared to that of the monomers. It will be demonstrated that the dye photodegradation kinetics was also dependent on the pore sizes.

Examination methods: UV-Vis optical spectroscopy, ellipsometric porosimetry, contact angle measurements, high resolution transmission electronmicroscopy, etc.

Wir laden 15 Minuten vor Beginn zu einem Get-together mit dem Referenten ein.

KONTAKT

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