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**Titania coatings deposited by industrial-scale magnetron sputtering**

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Within recent years titania (TiO<sub>2</sub>) coatings have found applications in a variety of areas such as catalysis, solar cells, optical devices, etc. TiO<sub>2</sub> is suitable in applications where self-cleaning and antibacterial properties are desirable due to its photocatalytic activity where irradiation of TiO<sub>2</sub> with UV light has two effects: Catalysis of the reaction of water and oxygen into highly reactive radicals which enable decomposition of organic compounds and a decrease in the contact angle with water towards super hydrophilicity.

Deposition of TiO<sub>2</sub> coatings using academic/small-scale equipment has been studied extensively, but only few systematic variations of the deposition parameters on large-scale equipment have been reported. When it comes to implementing self-cleaning or antibacterial properties into commercial products, optimization of the photocatalytic activity as well as the mechanical properties of the coatings are of vital importance.

TiO<sub>2</sub> and Cu-doped TiO<sub>2</sub> coatings have been deposited by means of reactive DC magnetron sputtering using industrial-scale equipment (CemeCon CC800/9 Sinox unit). The dependence of the coating structure on deposition parameters has been characterized. The crystal structure has been revealed by X-ray diffraction and the topography and morphology by electron microscopy.

It will be demonstrated that raising the deposition temperature and/or increasing the substrate bias voltage causes the rutile crystal phase to grow preferentially to anatase, and the morphology to change from highly porous (featherlike) to more dense coatings. Also, it will be shown that the photocatalytic activity is highly dependent on the coating thickness.

Depositions of TiO<sub>2</sub> coatings aimed for use in industrial applications, have been made on a variety of substrate materials, such as silicon, stainless steel, glass, aluminium and different types of plastics for testing of e.g. photocatalytic activity under UVA-light exposure, antibacterial properties and heat transfer and results here from will be shown.

**Keywords**

TiO<sub>2</sub>

Photocatalysis

Cu-doping

large-scale

