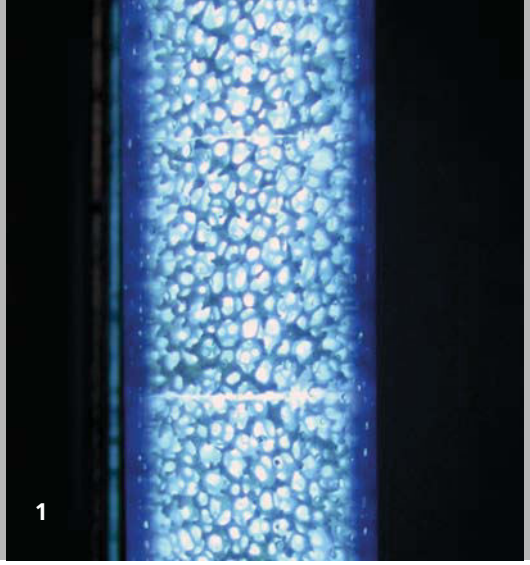

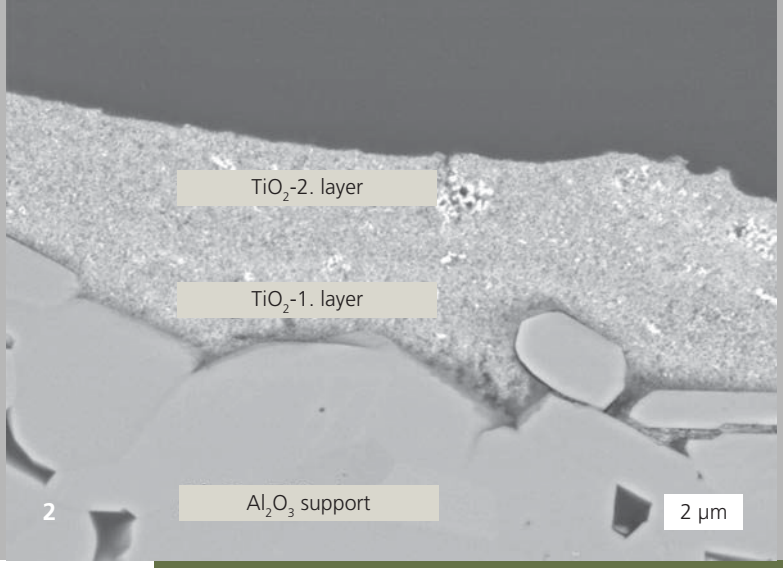

PHOTOCATALYTIC WASTEWATER TREATMENT WITH FUNCTIONALIZED CELLULAR CERAMICS

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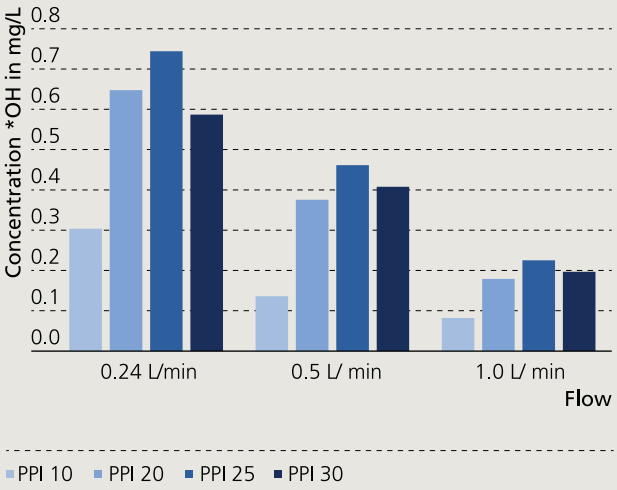
In the last years, micropollutants from anthropogenic sources, particularly persistent and bioaccumulative human as well as veterinarian pharmaceuticals come increasingly to the fore of public interest as they cannot be completely disintegrated by conventional wastewater treatment and are therefore enriched in the aquatic environment. AOP procedures (Advanced Oxidation Processes), like photocatalysis, with focus on the generation of hydroxyl radicals, which are not reaction selective, are able to achieve a complete oxidation of persistent substances and a simultaneous disinfection. The surface contact between pollutant and catalyst/light is most important for the photocatalytically initialized pollutant degradation. Large, optimally irradiated catalyst surfaces promote an efficient generation of hydroxyl radicals.

The immobilization of catalysts on cellular ceramic substrates permits higher interaction surfaces and advantageous penetration of light irradiation than low-efficient immobilization alternatives on membrane surfaces or container walls.

For that reason, Fraunhofer IKTS developed and produced TiO_2-coated cellular ceramics with different pore sizes (PPI – pores per inch) and geometries, which are photocatalytically activatable. AL_2O_3 foam ceramic supports between PPI10 (4–5 mm pore width) and PPI30 (2 mm pore width) were manufactured according to the Schwartzwalder method and afterwards coated with a TiO_2 suspension on all sides using immersion processes. The possible applications of the coated ceramics were analyzed under the usage of model pollutants and real wastewater.

A completely degradation of problematic pollutants, like Carbamazepin and Diclofenac, with simultaneous disinfection and a low-power consumption compared to other AOP-procedures was shown. IKTS offers application-oriented services for the development of materials and processes regarding the treatment of differently polluted water.

Hydroxyl radical generation in dependence of flow, pore size and irradiation power



1 *Cellular ceramics under UV-C irradiation in experimental set-up.*
2 *Electron microscopic image of two-time TiO_2-coated, cellular ceramics.*

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