PhD Candidate Profile

Name:
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Research Group:
Physico-Chemical Water Technologies

Research Centre:
Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB

University of Stuttgart, Institute for Interfacial Process Engineering and Plasma Technology IGVP
Environmental Interfacial Engineering

Department/School(s):
Faculty 4: Energy, Process Engineering and Biotechnology at the University of Stuttgart

College:
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Supervisor(s):
Prof. Dr. Thomas Hirth

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Area (field) of study:
UV- Advanced Oxidation Processes in liquid phase

Thesis Title:
Enhancement of existing engineering applications of UV- Advanced Oxidation Processes without additives in liquid phase

Abstract:
Recalcitrant pollutant oxidation via water photolysis by ultraviolet radiation at wavelength λ<190nm, has been the subject of intensive research in the past decade. This technique is one of the so-called advanced oxidation processes (AOP), which are based on the reactivity of OH radicals; which are able to mineralize organic water contaminants, leading to an efficient detoxification, purification or remediation, of wastewater. Taking into account the high quantum yield of water homolysis, the low penetration depth of radiation at wavelength λ<190nm and the short lifetime of the hydroxyl radicals, high local concentration of hydroxyl radicals are produced at the quartz water interface. This leads to a strongly marked heterogeneity of the AOP process, due to a very thin photoreaction zone at the quartz water interface, which is characterised by diffusion controlled reactions of short-lived primary radicals with organic substrate. Therefore the aim of this work is to

deeply understand the relation of hydraulics, optics and reaction mechanism involve in order to perform an effective photo-reactor design, to experimentally investigate the oxidation phenomena under different conditions of reactor geometry, flow and mixing in order to enhance the treatment process applying concepts of process intensification in flow-chemistry reactors on the micro- and milli-scale.

Collaborations:

Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB

University of Stuttgart, Institute for Interfacial Process Engineering and Plasma Technology IGVP Environmental Interfacial Engineering

Publications:

Patent application 32230185DE: „Vorrichtung zur photochemischen Behandlung von verunreinigtem Wasser“

Patent application 32230186DE: „Vorrichtung zur photochemischen Behandlung oder Reinigung von verunreinigtem Wasser“

Presentations:

N/A