PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar

Date: Wednesday, March 29, 2023, at 11:30AM
Location: POTR 234 (Fu Room)

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Enhanced Municipal Wastewater Treatment for Micropollutant Abatement in Switzerland: Options and Limitations of Ozonation

Abstract

The presence of micropollutants in water resources and the urban water cycle from many sources such as agriculture, municipal wastewater and industry has raised ecological and human health concerns. The options for the reduction of the micropollutant load are manifold and range from source control (e.g., stricter regulations for agriculture) to end of pipe solutions (wastewater and drinking water treatment). In Switzerland it has been decided to upgrade municipal wastewater treatment plants with an additional polishing step, either by ozonation or by activated carbon (powdered activated carbon, granular activated carbon) to reduce the discharge of micropollutants to the aquatic environment. This talk will provide information on the situation in Switzerland, the only country with a respective regulation in place, and then focus on the options and limitations of ozonation.

There are five factors which need to be considered to assess ozonation processes for micropollutant abatement in wastewaters: (i) reaction kinetics, which control the efficiency of the process, (ii) elucidation of the formation of transformation products by experimental and theoretical approaches, (iii) formation of oxidation by-products (e.g., bromate, carbonyl compounds) from the matrix, (iv) biological effects after ozonation, resulting from transformation products and/or oxidation by-products, (v) biodegradability of transformation products during post-treatment.

Bio

Urs von Gunten has a joint appointment between Eawag, the Swiss Federal Institute of Aquatic Science and Ecole Polytechnique Fédérale de Lausanne (EPFL) where he is a full professor. He is an internationally recognized expert on oxidation processes in water and wastewater treatment, including disinfection, micropollutant abatement, and formation of transformation products and disinfection byproducts. In the last two decades he was strongly involved in the application of ozone for enhanced municipal wastewater treatment for micropollutant abatement in Switzerland, from the laboratory experiments to full-scale implementation. He has co-authored a book and more than 270 publications in peer reviewed journals. He has been a Clarivate highly cited researcher multiple years. Besides his academic activities, he collaborates regularly with practitioners from the water sector, for example from 2004-2008 he was the head of the trans-disciplinary project “Water Supply for the 21st Century” and from 2013-2016 he was the head of the trans-disciplinary project “Regional Water Supply Basel-Country”, one of the Swiss cantons (states).