הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Special Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering,

Wednesday July 12th at 1:30pm

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Chemical Engineering, Technion

Using reporting bacteria in a combined photocatalytic-biological wastewater treatment

Water purification is often challenged by the presence of a large number of contaminants, some of which are too toxic for bacteria or too opaque for photocatalytic processes. A combination of Advanced Oxidation Processes (AOPs) and biological treatment is often presented as an integrated process that can overcome the difficulties of each method. For example, bacterial treatment can decrease the turbidity of the water stream, which reduces the efficiency of UV-illuminated based AOPs, such photocatalysis. On the other hand, photocatalysis can degrade compounds that are too toxic for bacterial treatment. However, a combined photocatalytic-biological treatment approach requires optimizing the design of the system in terms of retention time of each reactor and their sequence in real conditions, where the toxicity and turbidity might vary over time.

This research explores the configuration of a combined process of photocatalysis and biological treatment. An optimized process, in terms of sequence, recycling and retention time, can be designed based on complete data of the effluent composition, kinetics and the required level of purification.

In this study a new apporoch for a combined process, based on a control loop that responds to the bacteria well-being, is presented. The control unit is operated by on-line measurements of turbidity and bacterial-stress response that automatically control the process configuration. The bacterial-stress control is performed by bioluminescence, emitted from genetically modified *Escherichia coli*, proportional to biological-stress. The development of this toxicity-sensor can reduce the sampling interval to a few minutes scale. Thus, automatizing the integrated process becomes feasible.

Refreshments will be served at 1:15pm