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Enhancing natural wastewater treatment systems: the role of particles in sunlight-mediated virus inactivation





Enhancing natural wastewater treatment systems: the role of particles in sunlightmediated virus inactivation

Fact Sheet

Project Information		
PARVIRDIS		Funded under Specific programme "People" implementing the
Grant agreement ID: 220706		Seventh Framework Programme of the European
Project closed		development and demonstration activities (2007 to 2013)
Start date 1 July 2008	End date 30 June 2010	Total cost € 188 793,57
		EU contribution € 188 793,57
		Coordinated by ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE Switzerland

This project is featured in...

Energy and resources: alternatives, renewables, generation, distribution...efficiency all the way!

Objective

The processes by which viruses are inactivated in sunlight-exposed surface waters remains largely unknown. This lack of information severely limits our ability to predict the efficiency of and rationally design natural treatment systems that utilize sunlightmediated inactivation (e.g. constructed wetlands). Viruses commonly associate with particles in surface waters, including photoreactive particles that can 1) adsorb viruses and 2) produce reactive oxygen species (ROS) when exposed to sunlight. Virus adsorption onto the surface of photoreactive particles exposes them to elevated ROS concentration and may increase inactivation compared to free viruses. The goal of this research is to characterize the adsorption and inactivation of particleassociated viruses in the dark and exposed to sunlight, with the aim of predicting the fate of viral pathogens within natural systems and using this information to improve their efficiency. We will quantify how different viral characteristics (e.g. isoelectric points, capsid size and composition, genome type) influence adsorption and inactivation, and which modes of inactivation are dominant (e.g. ROS damage to viral host binding sites, destruction of viral capsids by ROS or adsorption, and modification or destruction of genomic nucleic acids by ROS or nucleases). To aid in this study, a novel gPCR-based method for determining virus viability will be developed, a tool that will be of use for a variety of fields including environmental microbiology, public health and medicine. The detailed information gathered in this study will then guide the development of methods to improve the viral removal efficiency of a highly controllable constructed wetland. Different wetland configurations will be tested to promote virus adsorption onto iron-oxide coated sand and to maximize viral exposure to ROS. In so doing, this project will increase the efficacy of low-cost, effective systems for water and wastewater treatment.

Fields of science (EuroSciVoc)

medical and health sciences > health sciences > public health

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engineering and technology > environmental engineering > water treatment processes > wastewater
treatment processes
natural sciences > biological sciences > biochemistry > biomolecules > nucleic acids
natural sciences > biological sciences > microbiology > virology
natural sciences > biological sciences > genetics > genomes
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Keywords

Health and environment (Environmental protection	<u>Mater quality monitoring</u>
reactive oxygen species sunlight su	stainable wastewater treatment
virus detection virus inactivation	

Programme(s)

<u>FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)</u>

Topic(s)

PEOPLE-2007-4-2.IIF - Marie Curie Action: "International Incoming Fellowships"

Call for proposal

FP7-PEOPLE-2007-4-2-IIF See other projects for this call

Funding Scheme

MC-IIF - International Incoming Fellowships (IIF)

Coordinator

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ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE

EU contribution

€ 188 793,57

Total cost

No data

Address

BATIMENT CE 3316 STATION 1 1015 Lausanne Switzerland

Region

Schweiz/Suisse/Svizzera > Région lémanique > Vaud

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation C Website C Participation in EU R&I programmes C HORIZON collaboration network

Last update: 1 August 2019

Permalink: https://cordis.europa.eu/project/id/220706

European Union, 2025