Pearl Programme for EArly-stage Researchers in Lille

Title of the thesis	Risk assessment related to Disinfection by-Product formation in drinking water
Acronym	DIP
Reference number	003

Hosting institution	**Employer**
Université de Lille Website: https://www.univ-lille.fr/home/	CNRS Website: http://www.cnrs.fr/en
Hosting research unit 1	**Hosting research unit 2**
Name: LAboratoire de Spectroscopie pour les Interactions, la Réactivité et l'Environnement Acronym: LASIRE Identification number: UMR 8516 Address: Campus de la Cité Scientifique, bâtiments C5, C8 et C4, Villeneuve d'Ascq Website: http://lasir.cnrs.fr/	Name: Institute for translational research in Inflammation Acronym: INFINITE Identification number: U1286 Address: Faculté de médecine-Pôle recherche-4e centre. Place Verdun. 59045 Lille Website: http://lille-inflammation-research.org/en/
Principal supervisor	**Co-supervisor**
Name: Gabriel Surname: BILLON Email: gabriel.billon@univ-lille.fr Phone: +33 (0)3.20.43.49.29	Name: Cécile Surname: VIGNAL Email: cecile.vignal2@univ-lille.fr Phone: +33 (0)3.20.97.42.33
Foreign co-supervisor	
Name: Emile Surname: CORNELISSEN Email: emile.cornelissen@UGent.be University: Ghent University Research unit: Particle and Interfacial Technology group (PainT) Website: https://www.ugent.be/bw/gct/en/research/paint	

Thesis information

Keywords	drinking water, disinfection by-product, inflammatory diseases, public health, climate change
Abstract	Chlorine has been highly beneficial to provide safe drinking water. However, in addition of microorganisms inactivation, chlorine conducts systematically to the formation of a variety of toxic disinfection by-products (DBPs) through its reaction with natural organic matter (NOM) present in all water resources. Moreover, bromide and iodide presence in water lead to the formation of iodinated and brominated disinfection by products which were demonstrated to be more genotoxic and cytotoxic than their chlorinated analogues. This is of major concern considering the sustainability of drinking water quality in the context of climate change, as both precursors natural organic matter and halide (i.e. bromide and iodide) concentrations are seen to increase. This project proposes a new integrative approach to assess the formation of disinfection by-products in a context of climate change and the toxicity of these formed DBPs. The PhD student will perform water membrane fractionations to concentrate and divide the natural organic matter by size. Fractionated waters will then be chlorinated to mimic treatment conditions, and the formed DBPs will be analysed. Increasing concentrations of NOM, bromide and iodide will be used to

	simulate the effect of climate change. The toxicity of the complexed water matrix after chlorination will be assessed on primary intestinal epithelial cells to mimic drinking water exposure. An interdisciplinary project in a cross border cooperation between Lille and Ghent Universities is set up to address this issue related to the drinking water quality. This project involves: - LASIRE Laboratory (ULille) which has experience in DBP formation and analysis, kinetics, drinking water processes and natural organic matter characterization; - INFINITE (ULille), team specialized in analysing health effects of environmental contaminants; - Particle and Interfacial Technology group (PainT) from UGhent which proposes to perform NOM fractionation and characterization. A 4th year dedicated to biological stability is foreseen in this research group; A research stay to ICRA (Catalan Institute for water research) will be performed for natural organic matter characterization by high resolution mass spectrometry.
Expected profile of the candidate	The candidate must be a chemist, chemical/environmental or bio-engineer with skills in analytical chemistry. Knowledge on water treatment, cell biology and working conditions in biological safety cabinet would be appreciated. An important sense of organization and communication, as well as the ability to work with several European partners involved in this project are mandatory.
Application procedure	The application procedure is detailed on the European programme PEARL website www.pearl-phd-lille.eu. The funding is managed by the I-SITE ULNE foundation which is a partnership foundation between the University of Lille, Engineering schools, research organisms, the Institut Pasteur de Lille and the University hospital. The application file will have to be submitted before April 15, 2020 (10h Paris Time) and emailed to the following address : international@isite-ulne.fr.
Net salary and Lump Sum	A net salary of about €1,600 + €530 per month to cover mobility, travel and family costs.