Participants Journée Thématique GIS-Réseau Fluor 16 Mars

EU Regulations and Issues of PFASs

Thematic Webinar on PFASs (March, 16th 2021)

French Fluorine Network (GIS)

9:00 Introductive Remarks (BA)

9:10 Presentation of the French Fluorine Network, GIS (Dr **Frederic LEROUX**, Head of GIS)

9:30-10:10am: Dr **Xenia TRIER** (European Environment Agency, Denmark) *Lifecycle impacts of PFAS – concerns, knowledge gaps and how to avoid harm to people and the planet?*

10:10-10:50am: Dr **Guido MOLLER** ((Public Affairs of Daikin Chemical, Europe) *Fluorochemical Substances - PFAS regulatory map and trends*

10:50-11:00am Intermittence

11:00-11:40 Dr **Marie-Pierre KRAFFT** (CNRS Strasbourg, France) *Alleviating tumor hypoxia with perfluorocarbon-based oxygen carriers*

11:40-12:20 Prof. **Ian COUSINS** (Stockholm University, Department of Environmental Science, Sweden) *Sources, transport and fate of various PFAS in the atmosphere.*

12:15-13:15: lunch break

13:15-14:00: Prof. **Martin SCHERINGER** (ETH Zurich, Switzerland) *When chemicals don't do chemistry: implications of environmental persistence for chemicals assessment*

14:00-14:45: Prof. **Rainer LOHMANN** (University of Rhode Island, USA) *PFAS - from fluoropolymers to the Arctic Ocean*

14:45-15:00am Intermittence

15:00-15:40: Dr **Jeffrey LEWIS** (Université de Göteborg and Directeur général, ECT2 Sweden)
Case Study Pilot Testing Synthetic Media and Granular Activated Carbon for Treatment of Poly- and Perfluorinated Alkyl Substances in Groundwater

15:45- Round Table Discussion on PFASs

Lifecycle impacts of PFAS – concerns, knowledge gaps and how to avoid harm to people and the planet?

Dr Xenia TRIER (European Environment Agency, Denmark)

Abstract:

Dr. Xenia Trier, (Chemicals, Environment and Human Health Expert Air Pollution, Environment and Health (HSR1) Health and Sustainable Resource Use, Copenhague, DK) has a background in chemistry and physics from Aarhus University, Denmark and Carlton University, Canada (2000), and holds a PhD in analytical chemistry on PFAS used in food contact materials of paper and board (2011), from University of Copenhagen, Denmark. Since 2002 she has been studying PFAS uses, characteristics, analyses and occurrences in various media, their effects and regulations. Before her PhD she worked in a commercial laboratory on environmental analysis (1998-2001), and at the Danish National Food Institute at the Technical University of Denmark (2001-2016) doing research, compliance/enforcement testing and advisory to the national and European authorities. Since 2016 she is at the European Environment Agency, where she provides and coordinates science-policy advice to member states and EU institutions on chemical legislations, including on PFAS and Safe and Sustainable by Design.

Dr **Guido MOLLER** ((Public Affairs of Daikin Chemical, Europe) *Fluorochemical Substances - PFAS regulatory map and trends*

Abstract:

Dr. **Guido Möller** (**Director Advocacy / Public Affairs)**
PhD from the Ruhr-University Bochum (Germany) on Fluoroorganic-and inorganic synthesis.
1996 I joined Daikin as Technical Service Manager for our DAI-EL Fluoroelastomers.
From 2006 -2016 I was in charge of the european DAI-EL Fluororubber business as a Business Manager (in competition to the more famous brand Viton)
2016 -2020 I was responsible for the entire Fluoropolymer Business in Europe incl Fluoroplastics (PTFE,ETFE,PFA etc), Rubber, Coating and Polymer Process Aids as Business Director.
From Jan 2021 my new role is Director Advocacy / Public Affairs

Dr **Marie-Pierre KRAFFT** (CNRS Strasbourg, France) **Alleviating tumor hypoxia with perfluorocarbon-based oxygen carriers**

Abstract: Hypoxia is a major impediment to many foremost cancer treatments that require O_2 for generation of reactive oxygen species, the actual tumor cell killers. Liquid perfluorocarbons (PFCs) are inert gas solvents that help alleviate this oxygen deficit situation. PFC nanoemulsions have demonstrated oxygen delivery to tissues. The lifetime of $^1O_2$ in PFCs is considerably expanded. PFC nanodroplets extravasate and accumulate in tumors. Alternatively, PFCs stabilize injectable O_2 microbubbles. On-demand local O_2 delivery is facilitated by ultrasound. Liquid PFC nanodroplets that convert into microbubbles upon activation provide another shuttle for O_2-delivery. PFC nanocarriers can be enriched with fluorescent dyes, radiopaque materials, photo(sono)sensitizers, loaded with chemotherapeutics, and fitted with targeting devices, or stimuli-responsive functions for image-guided theranostics. We will review recent literature on PFC-based O_2 carriers to enhance the efficacy of radio-, photo(sono)dynamic- and chemo- therapies. PFC-based carriers may also provide novel strategies to promote T-cell trafficking into tumors to improve immune responses.

Dr. Marie Pierre Krafft is Research Director at the Charles Sadron Institute (CNRS), University of Strasbourg. Her current research bears on the design, engineering and investigation of nano-compartmented, fluorocarbon-promoted molecular self-assemblies; fluorocarbon-based therapeutics, and self-organization of complex systems (active soft matter). She has published over 160 papers, 10 patents, given some 80 invited lectures in International Meetings, is Co-Editor in Chief for Current Opinion Colloid Interface Science, received Awards from the Chemical Society of Japan and the French Académie des Sciences. She is a Member of the European Academy of Sciences.

Prof. **Ian COUSINS** (Stockholm University, Department of Environmental Science, Sweden) *Sources, transport and fate of various PFAS in the atmosphere.*

Abstract:
Per- and polyfluoroalkyl substances (PFAS) are synthetic organic chemicals which have been observed in the global environment, even in locations far away from where they are emitted. In this presentation, I will provide an overview of current knowledge of sources of PFAS to the atmosphere and how they are transported in air. In particular, I will focus on two areas of research in my group; (1) transport of PFAS on sea spray aerosols (SSA) and (2) fluoropolymer manufacturing sites as a source of PFAS to the atmosphere. Several laboratory studies from our group have demonstrated the water-to-air transfer of certain PFAS in SSA simulation experiments, suggesting that SSA is an important vector of certain PFAS to the atmosphere. I will present additional data from recent monitoring studies that provides convincing field evidence for the importance of SSA as a global source of PFAS. Certain PFAS are also known to be emitted to the atmosphere via the flue gas stacks of fluoropolymer manufacturing plants, but there are few measurements of PFAS in the air surrounding these plants. I will present atmospheric measurements undertaken with different sampling methods (including high volume air samplers connected to cascade impactors) downwind of fluoropolymer manufacturing sites demonstrating the long-range atmospheric transport of certain PFAS that are emitted from fluoropolymer manufacturing plants.

Prof. Ian Cousins has worked at the Department of Environmental Science at Stockholm University since 2002. His research comprises a combination of experimental and modelling approaches to investigate the sources, transport, fate and exposure of contaminants. For the last 20 years, he has conducted research on per- and polyfluoroalkyl substances (PFAS) and works closely with analytical chemists in his department to better understand the environmental behaviour of these contaminants. Prof. Cousins has published more than 170 peer-reviewed articles and 8 book chapters. He was designated as a Highly Cited Researcher in 2018 and 2020. In 2020, Prof. Cousins kicked off the PERFORCE3 project, which is a Europe-wide multi-partner doctoral research training programme in the field of PFAS that he coordinates. He recently became an Associate Editor of Environmental Science and Technology.

When chemicals don't do chemistry: implications of environmental persistence for chemicals assessment

Prof. Martin SCHERINGER (ETH Zurich, Switzerland)

Abstract:
A main direction of chemical research is concerned with generating chemicals that offer novel properties that are useful in technical applications. In contrast, concepts for dealing with chemicals that leave the materials or products of their intended applications and subsequently remain in the environment for long periods of time are less of a focus in chemical research. The problem of chemicals that circulate in the environment for long periods of time has been discussed in the field of chemical risk assessment under the notion of “environmental persistence”. Environmental persistence means that in the natural environment there are no or only very few processes that lead to a breakdown and, eventually, to mineralization of an organic chemical or, more precisely, that the rate constants of these processes are very small so that these chemicals “don’t do much chemistry” in the environment. Per- and polyfluoroalkyl substances (PFAS) are an important group of environmentally persistent chemicals. The key question of this contribution is: what does the high persistence of PFAS imply for their hazard and risk assessment? In the EU, the environmental persistence of chemicals was highlighted already before the current chemicals regulation, REACH, entered into force in 2007, namely in the Technical Guidance Document on Risk Assessment of 2003, where the particular challenges posed by chemicals that are persistent, bioaccumulative and toxic (PBT) were pointed out. On this basis, when REACH entered into force, a PBT assessment was made a mandatory part of the assessment process in the EU. Subsequently, triggered by the ongoing societal discussion about PFAS over the last years, the question of how environmental persistence in particular should be used in chemicals assessment and management has received even greater attention. The so-called P-sufficient approach to chemicals management is the latest step in this development. The main conclusion from the analysis of the implications of environmental persistence is that future development of chemical products should focus on substances without environmental persistence. This is also in line with the Green Chemistry principle no. 10, “Design for Degradation”.

Dr. Martin Scheringer is a professor of environmental chemistry at Masaryk University in Brno, Czech Republic, and a research scientist at ETH Zürich, Zürich, Switzerland. He has worked in the field of chemical risk assessment since 1994 and has published more than 260 peer-reviewed scientific articles and three books. From 2015 to 2020 he was an Associate Editor of the ACS journal, Environmental Science & Technology. In addition to his scientific research, he has conducted many chemical-focused projects with the UN Environment Programme (UNEP), with the OECD, and with several national governments. He also works on improving the science-policy interface in the area of chemicals assessment and management.

PFAS - from fluoropolymers to the Arctic Ocean

Prof. Rainer LOHMANN (University of Rhode Island, USA)

Abstract:

From fluoropolymers to the Arctic Ocean Fluoropolymers are a group of polymers within the class of per- and polyfluoroalkyl substances (PFAS). As is well known, finished fluoropolymer products are inert, extremely durable, and thus persistent products. The objective here is to evaluate the evidence regarding the environmental and human health impacts of fluoropolymers throughout their life cycle(s), and consider whether there is a discernible link between fluoropolymers and PFAS in the Arctic region. Production of some fluoropolymers is intimately linked to the use and emissions of legacy and novel PFAS as polymer processing aids, and several of these compounds (e.g., PFOA, HPFO-DA) have been detected far from manufacturing sites. A variety of other PFAS, including monomers and oligomers, are emitted during the production, processing, use, and end-of-life treatment of fluoropolymers, and have been detected in wildlife. There are also serious concerns regarding the toxicity and adverse effects of fluorinated processing aids on humans and the environment. The presence of polytetrafluoroethylene (PTFE) microparticles has been demonstrated in remote regions, including the Arctic, highlighting the challenge of preventing the dispersion of persistent products in the environment. Overall, there is no scientific rationale for concluding that currently produced fluoropolymers are of low concern for environmental and human health. Given fluoropolymers' extreme persistence; emissions associated with their production, use, and disposal; and a high likelihood for human exposure to PFAS, their production and uses should be curtailed except in cases of essential uses.

Rainer Lohmann (Professor of Oceanography) is the Director of the University of Rhode Island Superfund Research Center which focuses on Sources, Transport, Exposure and Effects of PFAS. His group conducts research into the sources, transport, and bioaccumulation of anthropogenic pollutants often relying on the use of passive samplers. Other than PFASs, his research covers dioxins, PCBs, legacy pesticides and emerging contaminants. Lohmann initiated a global effort to monitor organic contaminants in the waters of the world, termed AQUA-GAPS, which started field trials in 2016. He serves as Editor for Environmental Toxicology and Chemistry. He was trained in Chemical Engineering at the *Ecole Européenne des Hautes Etudes des Industries Chimiques de Strasbourg* (France) and got his Ph.D. in Environmental Science from Lancaster University (UK). Lohmann serves as Editor for Environmental Toxicology and Chemistry, and on the Editorial Boards of Environmental Science & Technology and Environmental Science & Technology Letters, among others.

Case Study Pilot Testing Synthetic Media and Granular Activated Carbon for Treatment of Poly- and Perfluorinated Alkyl Substances in Groundwater

By Dr **Jeffrey LEWIS** (Université de Göteborg and Directeur général, ECT2 Sweden)

Abstract:
This study report on the results of a pilot scale test to assess the capability of two different media for the ex-situ remediation of poly- and perfluorinated alkyl substances (PFAS) in groundwater. This pilot compared ion exchange resin to granular activated carbon (GAC) and evaluated the in-place regeneration of the resin to restore its capacity to remove PFAS. During the pilot test, both resin and GAC removed perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) below U.S. Environmental Protection Agency (USEPA) health advisories (HAs) of 70 nanograms per liter (ng/L) in any combination. At a common empty bed contact time (EBCT) of five minutes, the resin treated over eight times as many bed volumes (BVs) of groundwater as the GAC before PFOS exceeded 70 ng/L and six times as many BVs for PFOA. On a mass-to-mass basis, resin removed over four times as much total PFAS per gram as GAC before breakthrough was observed at the USEPA HA. The resin in the lead vessel was then regenerated using a solution of organic solvent and brine, which had treated water up to exceedance of the USEPA HAs for PFOS and PFOA. The pilot test demonstrated in-place regeneration of the resin to near-virgin conditions. The regenerated resin was used to treat the contaminated groundwater up to the same breakthrough point and PFAS removal results were consistent with virgin resin.

Jeffrey Lewis With over two decades of experience in the fields of hydrogeology, environmental remediation and geotechnical engineering, Jeffrey has been responsible for the most detailed groundwater PFAS transport modelling projects in Sweden. As a docent (associate professor) in hydrogeology with a research interest in PFAS remediation and mobility, he takes pride in both my strong theoretical background and extensive field experience. Since 2020, he has been General Manager, ECT2 Sweden.