

Séminaire

Mardi 28 mai 2024 à 10h30
Amphithéâtre Henri Benoît

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PFAS: Environmental Impacts and Societal Challenges

The unique combination of properties provided by substances fitted with perfluoroalkyl chains (*F*-chains, C_nF_{2n+1} -) ("PFAS"), including simultaneously ultimate thermal stability and chemical inertness, utmost hydrophobicity and substantial lipophobicity, extreme surface activity, propensity for phase separation and compartmentation, capacity for forming highly stable and thin self-assembled condensed films, tunable wetting properties, excellent sun light resistance, water refractive index matching, has generated countless, highly diverse, cost-effective industrial, technological and every-day uses related to safety, energy saving, high-tech innovation and consumer convenience. However, the same properties cause such compounds, and particularly *F*-alkylcarboxylic acids and *F*-alkane sulfonates, to be highly persistent in the environment and bioaccumulative, leading to ubiquitous worldwide exposure of biota and worrying health issues. Few alternative products or technologies have so far emerged that can match the feats of fluorinated surfactants and polymers. New products and technologies are critically needed, as well as increasingly global PFAS risk management. More responsible, more selective use is indispensable in order to reduce exposure and health risk. Polymer scientists and Colloid and Interface chemists

have a vocation to aid solve these issues by designing new surfactants and polymers, filling in knowledge gaps about the physicochemical behavior of PFASs in the environment, investigating the likely role of their specific "super" hydrophobic, segregating, self-assembling and interfacial compartments in their often inconsistent pharmacokinetic and toxicity patterns, providing creative technological answers to the growing global demand for high-performance materials, and thus help preserve (or replace) the considerable economic and societal benefits of these unique chemicals.

PFAS Uses: Some Examples From Everyday Life



Indispensable ?

See the recent meeting on PFAS organized by MITI and DRE (CNRS):

<https://miti.cnrs.fr/evenement-scientifique/colloque-pfas-enjeux-et-alternatives/>

Evich, M.G. et al. Per- and polyfluoroalkylated substances in the environment. *Science* **375**, 512 (2022).

Wang, Y. et al. Fluorine chemistry in rechargeable Batteries: Challenges, progress, and perspectives. *Chem. Rev.* **124**, 3494 (2024)

Krafft, M.P. and Riess, J.G. Selected physicochemical aspects of poly- and perfluoroalkylated substances relevant to performance, environment and sustainability- Part one. *Chemosphere* **129**, 4-19 (2015).

Krafft, M.P. and Riess, J.G. Per- and polyfluorinated substances (PFASs): Environmental challenges. *Curr. Opin. Colloid Interface Sci.* **20**, 192-212 (2015).