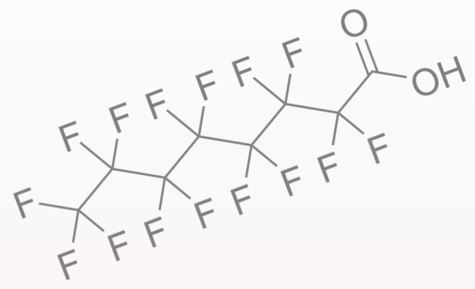
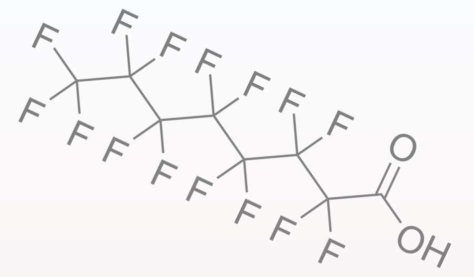


Per- and Polyfluoroalkyl Substances (PFASs)



1. What are PFASs?

Per- and polyfluoroalkyl substances (PFASs) are a group of man-made compounds that mainly contain carbon-fluorine bonds. PFASs have been used for over 60 years in hundreds of consumer and industrial applications including:

- stain resistance in textiles
- non-stick surfaces on pans
- fire-fighting foams
- fume suppressants in metal plating industry

2. How do they affect the environment and human health?

While their usefulness makes PFASs hard to live without, there are a few downsides. PFASs are:

- resistant to degradation
- very persistent in the environment
- bioaccumulative
- associated with adverse health effects such as:
  - higher cholesterol
  - low birth weight
  - delayed onset of puberty
  - reduced immunologic response to vaccines in animals
  - cancer
  - liver disease

3. What is the exposure pathway?

People can be exposed to PFASs through:

- drinking PFASs-contaminated water
- eating food prepared, packaged, or processed with equipment that contains PFASs or if the food is grown in soil or water that is contaminated with PFASs
- working in a PFASs production facility
- using PFASs in a production process
- using fire suppressants foam containing PFASs

4. Are there remediation and removal options for soil and water?

There are some defluorination techniques available but they only work with a few types of PFASs. There is much research needed in this area.

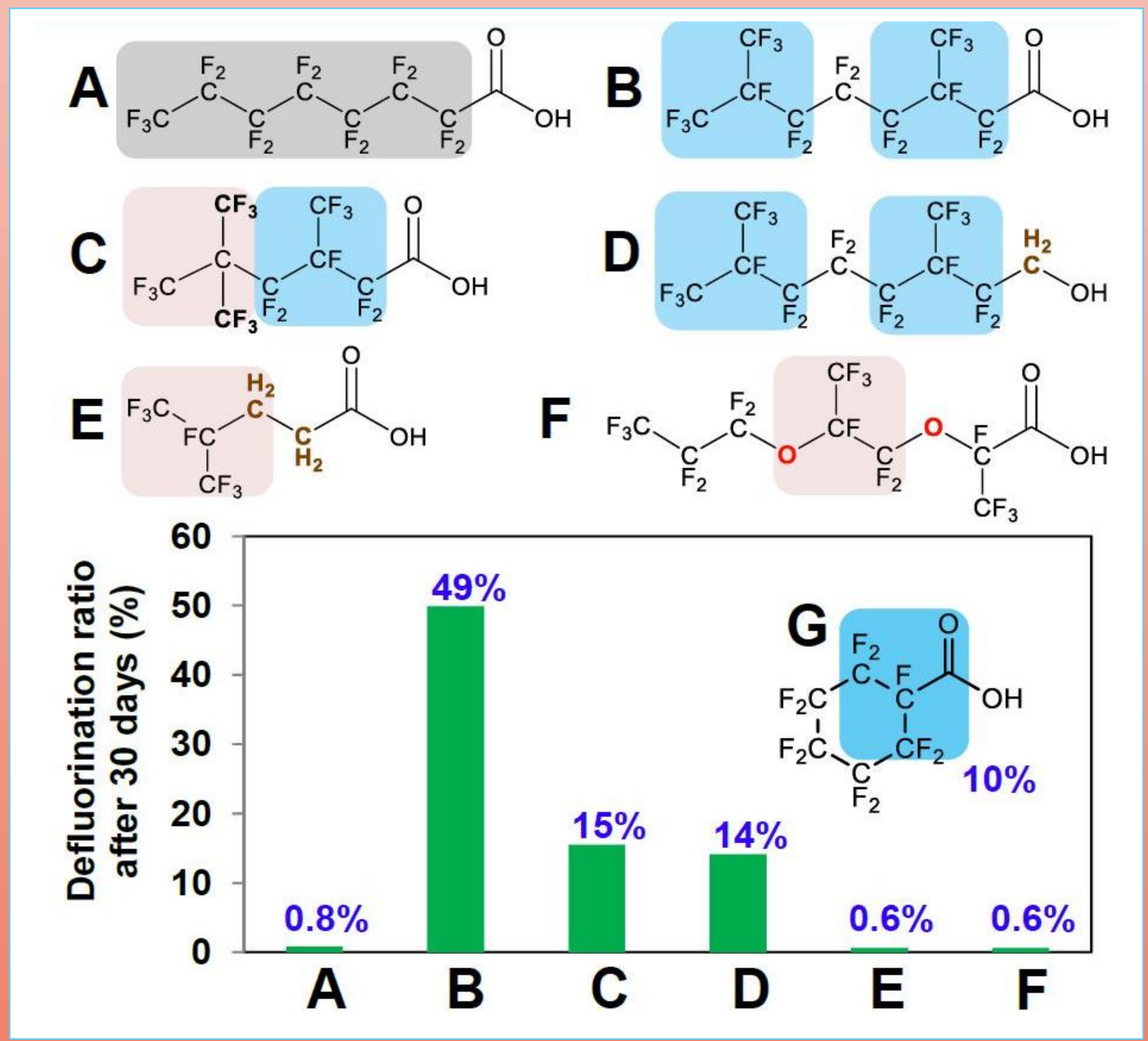
New Collaborative Research & Outreach Efforts to Reduce PFASs Contamination

Although defluorination has been considered highly challenging, cobalt-vitamin B12-catalyzed abiotic and microbial dehalogenation of other halides (chloride, bromide and Iodine) have been extensively researched. With funding from the National Science Foundation, Dr. Yuijie Men (U of I researcher) has teamed up with two researchers from the University of California, Riverside, Drs. Jinyoung Liu and David Volz, to:

1. Identify the dependence of defluorination susceptibility on specific branched PFAS structures.
2. Elucidate the relationship between cobalt coordination structure and catalytic defluorination activity.
3. Determine redox conditions enabling cobalt-catalyzed defluorination reactions.
4. Characterize the structure and toxicity of defluorination products.

ISTC will be working on an outreach and education campaign, which includes several components, in order to raise awareness of the PFASs issue and promote research solutions:

1. This display
2. Website on this project's PFASs research
3. Emerging Contaminants Conference with a special session on PFASs
4. Teacher workshop on curriculum about PFASs
5. Several seminars on PFASs



Preliminary research identified a series of key relationships between specific structure and the extent of vitamin B12-catalyzed defluorination. Some structures showed more defluorination than others (graph). Defluorination-reactive branches (blue), defluorination-ineffective branches (red) and linear chain (grey) non-reactive.

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