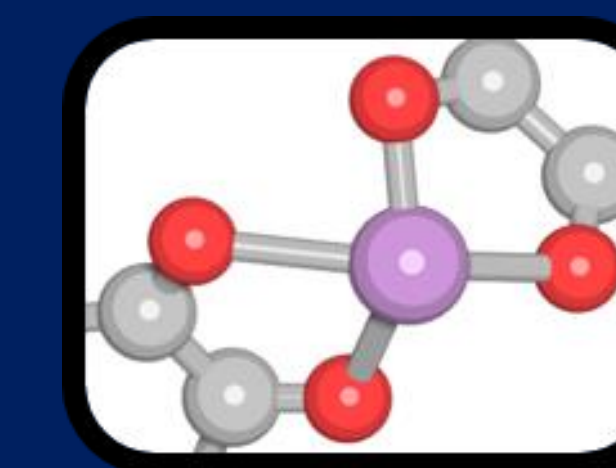




Cyclodextrin Metal Organic Frameworks for PFAS Adsorption

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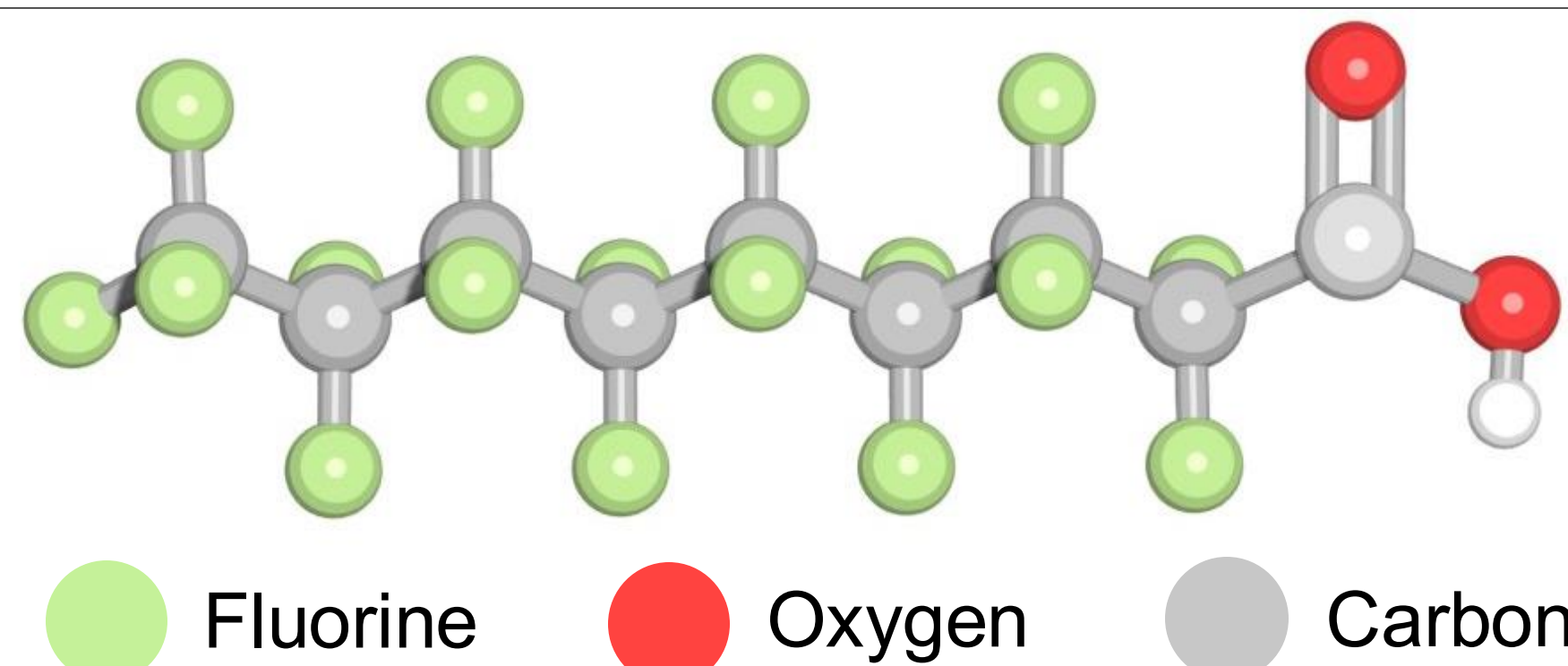


F.E.M. Lab

What are PFAS?

Perfluoroalkyl and polyfluoroalkyl substances, also known as PFAS, have become a prevalent issues in today's world. They have been used for their water, heat and stain resistant qualities since the 1950's. However, in the early 2000's studies showed that PFAS are carcinogenic. This set off a chain of research and development leading towards undoing half a century of implementing these "forever chemicals" into our infrastructure. Importantly, New Hampshire ranks amongst the top five states in PFAS water contamination.

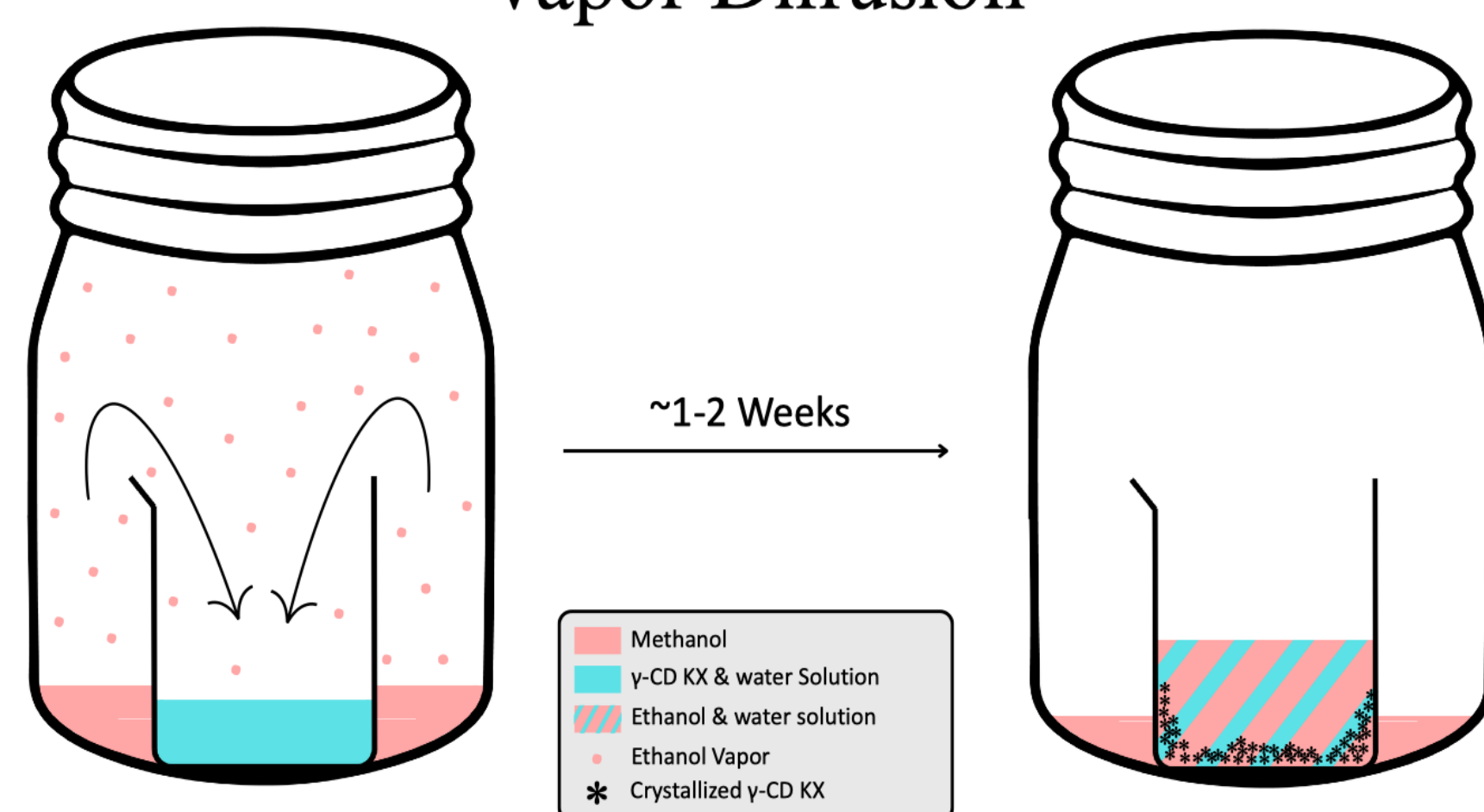
Metal organic frameworks, MOFs, have become a key point of interest for us. These molecules can act as a cage to capture PFAS and facilitate their removal from contaminated sources. Their pore tunability, high surface area, and high absorption capacity have guided our research towards finding a solution for removing PFAS from local water sources.



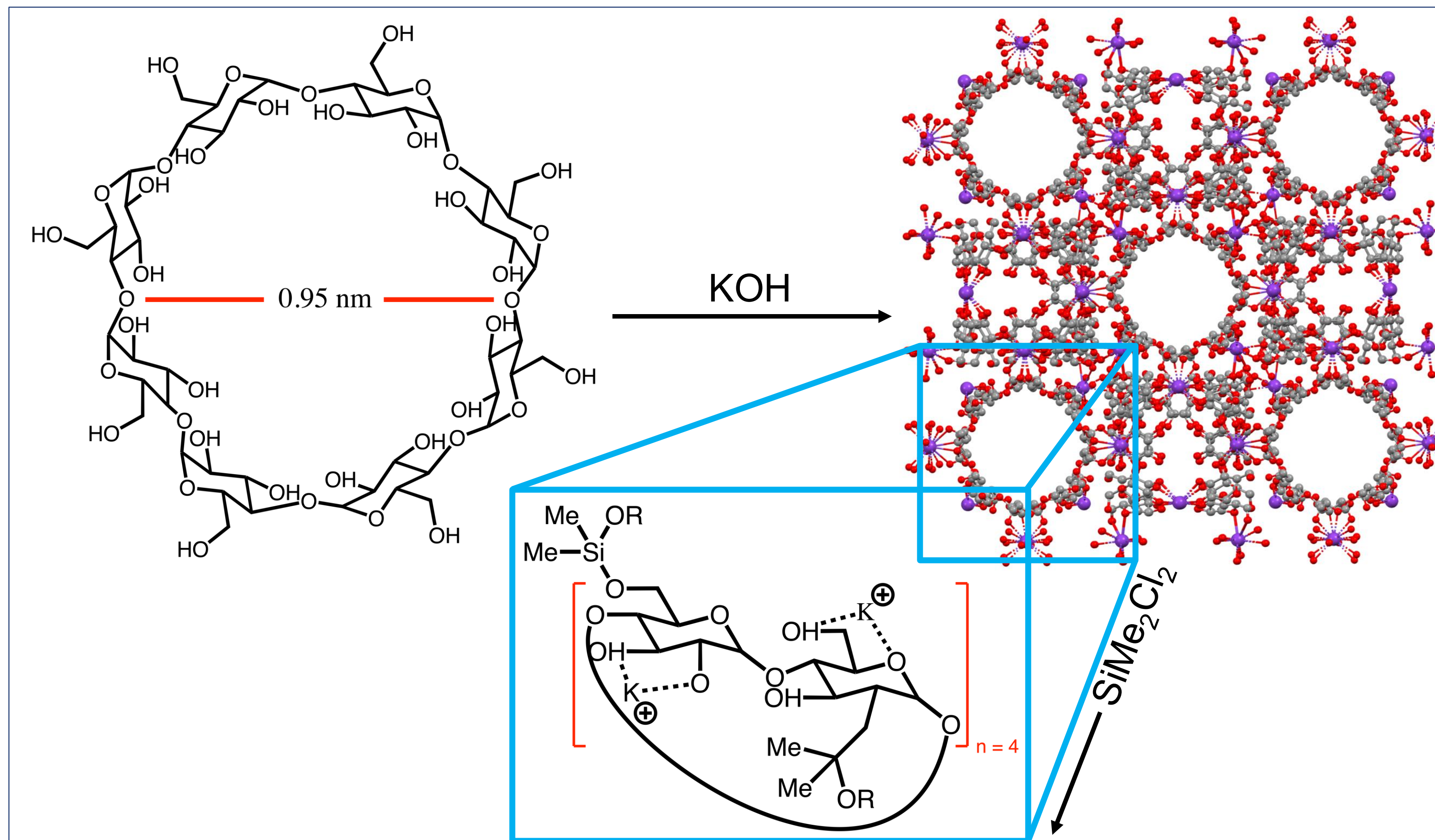
Vapor Diffusion Technique

The key method of creating our MOFs was through vapor diffusion chambers. A 100 mL beaker with a 5 mL solution of water, γ -CD, and a potassium salt, was placed in a 1 L jar containing excess methanol to saturate the environment. They were then left for ~1-2 weeks in a dark, stable environment. After sufficient crystals grew, they were vacuum filtered and dried, where they were then characterized.

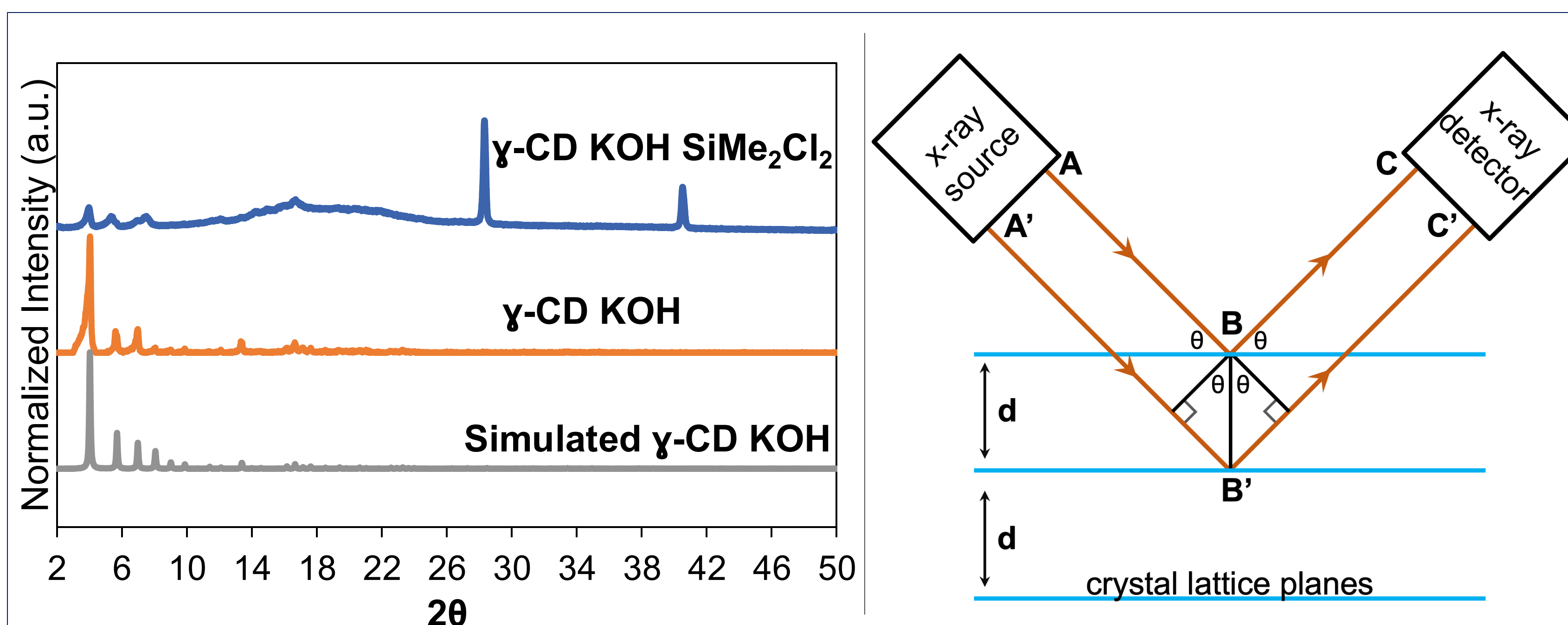
Vapor Diffusion



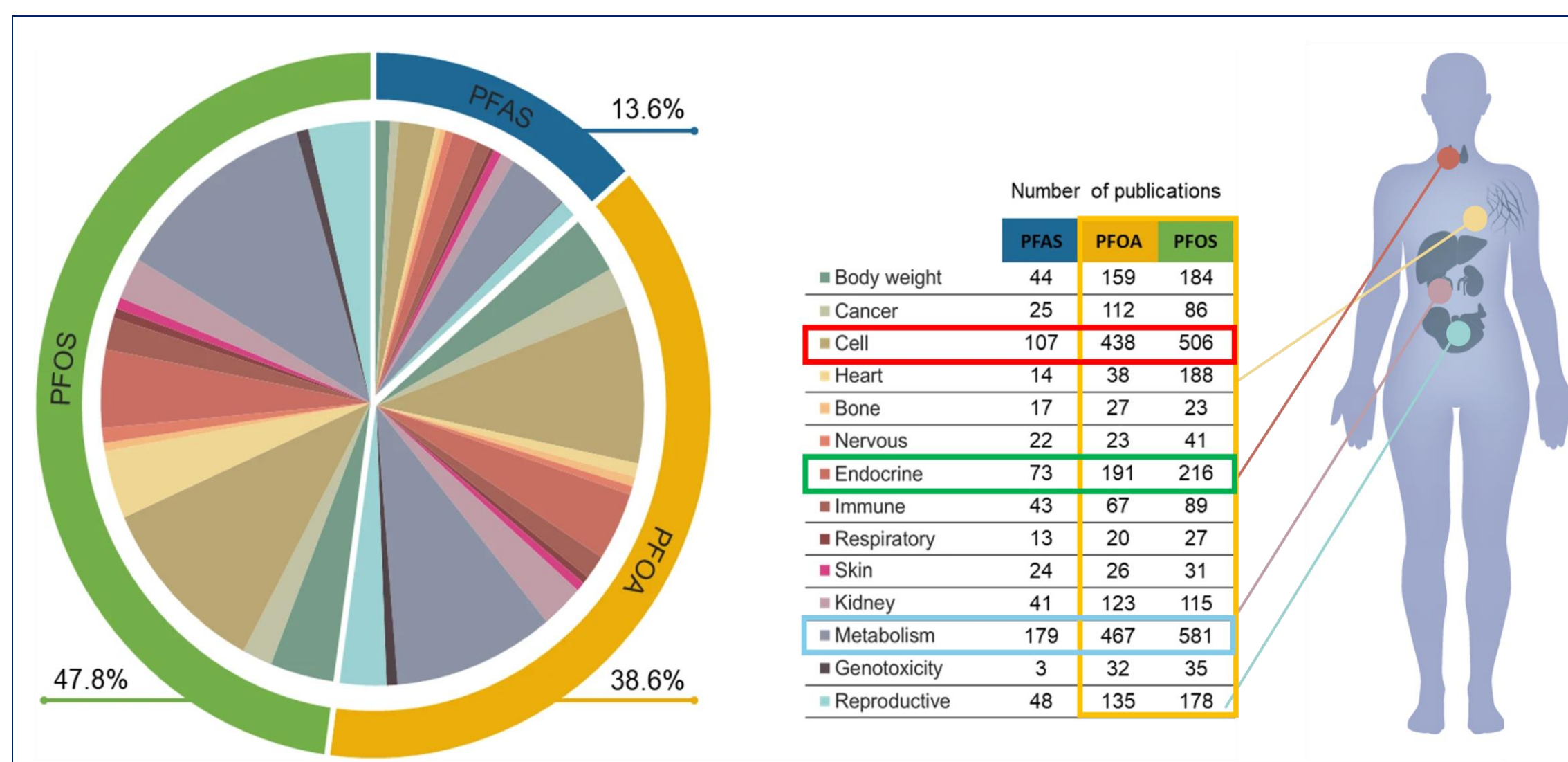
Formation and Crosslinking of γ -Cyclodextrin



PXRD Analysis of Hydroxide Formation



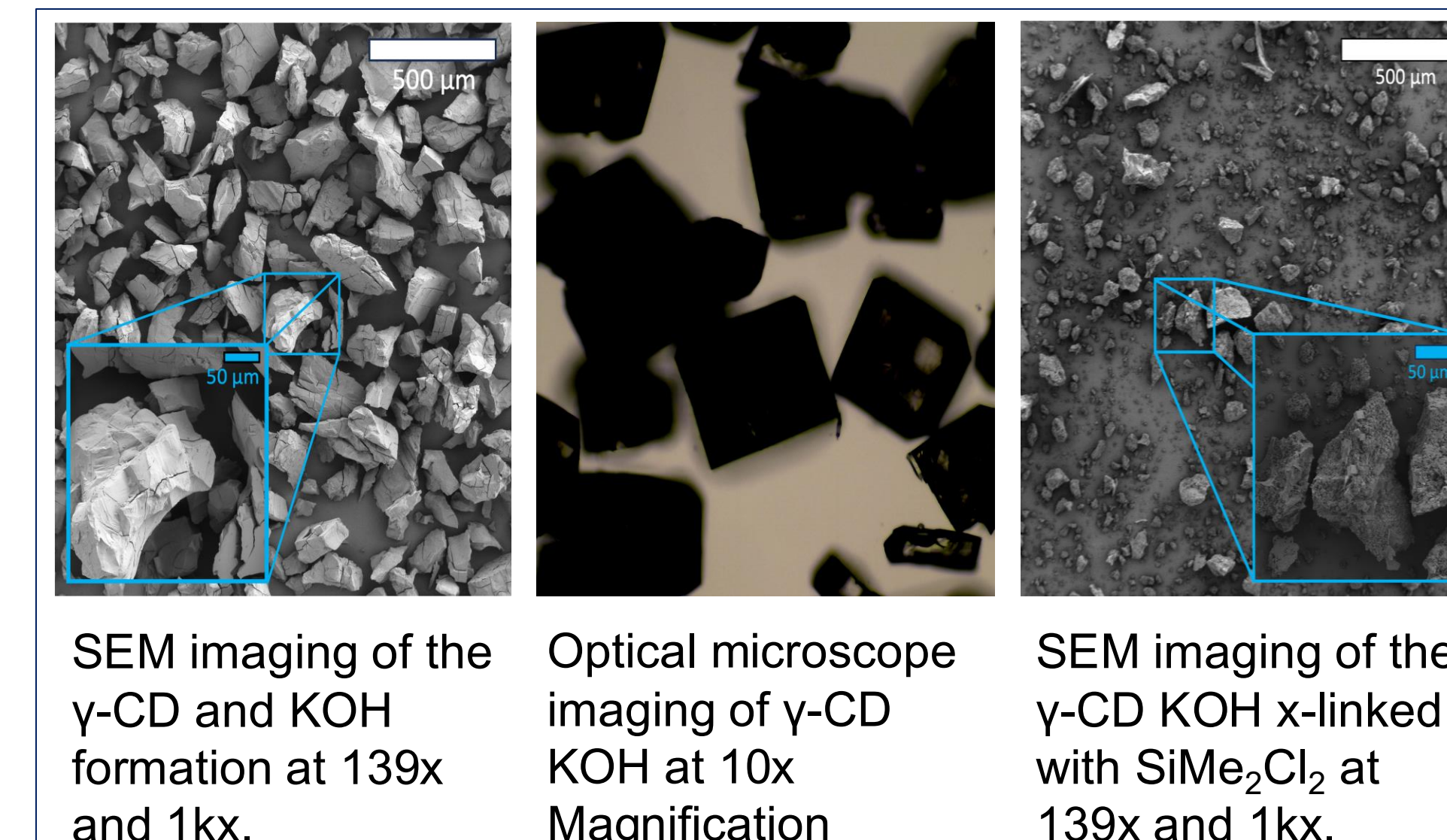
PFAS' Effects on the Human Body



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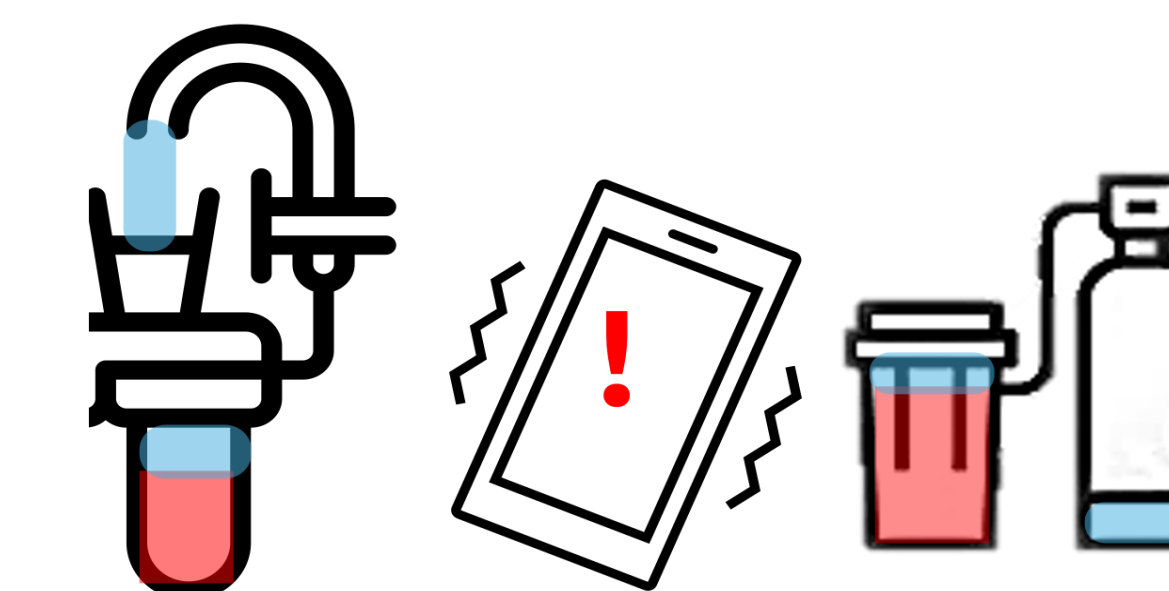
PFAS has been extensively studied since its release and has recently been linked to many forms of cancer, including thyroid, breast, testicular, kidney, and much more. PFOAs and PFOS, subtypes of PFAS, are the most common forms, and are the main concern when research the link to cancer.

SEM and Optical Imaging



Future Work and Applications

Smartphone app-based/portable sensors



Water Filtration Systems for domestic water

Portable sensors for environmental detection



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