Notes From the Field: Observations of PFAS in Industrial Air and Consumer Products

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Polyfluoroalkyl substances (PFAS) are a large and diverse group of compounds that are widely used in industry to make fluoropolymer coatings used in non-stick cookware, fire retardants, stain and water repellents, furniture, waterproof clothing, pizza boxes and take-out containers, food packaging, carpets and textiles, rubbers, plastics, electronics, dental floss, and other products. These compounds have recently come under scrutiny from regulatory and health agencies because they last an extremely long time in the environment, can travel and transfer from one system to another [1], and may cause serious health effects [2]. These substances are increasingly critical to measure because even exceptionally low concentrations (ppt level) may be relevant to environmental and health interests. Measuring low concentrations with varying structures and identities presents a challenge for traditional instrumentation.

Sensitive PFAS Detection

TOFWERK's API-TOF with iodide reagent ion chemistry has been shown to detect PFAS compounds with remarkably high sensitivity [3]. Recently, we noticed PFAS signal in samples measured with the Vocus Aim CI-TOF; including ambient air samples from an industrial facility, and headspace samples from cosmetics and food packaging.

Figure 1 shows the mass spectral peaks of several PFAS detected in the headspace of mascara. The PFAS compounds are detected as the parent molecule *M* clustered with the iodide reagent ion (M•I-). The molecular identity is based on the chemical formula determined from precise mass-to-charge ratio measurement and confirmed using isotope patterns. Because of their high halogen content, PFAS have a unique mass spectral signature.

Figure 2 shows comparison of PFAS signals in industrial air, waterproof mascara sample headspace, and popcorn sample headspace.

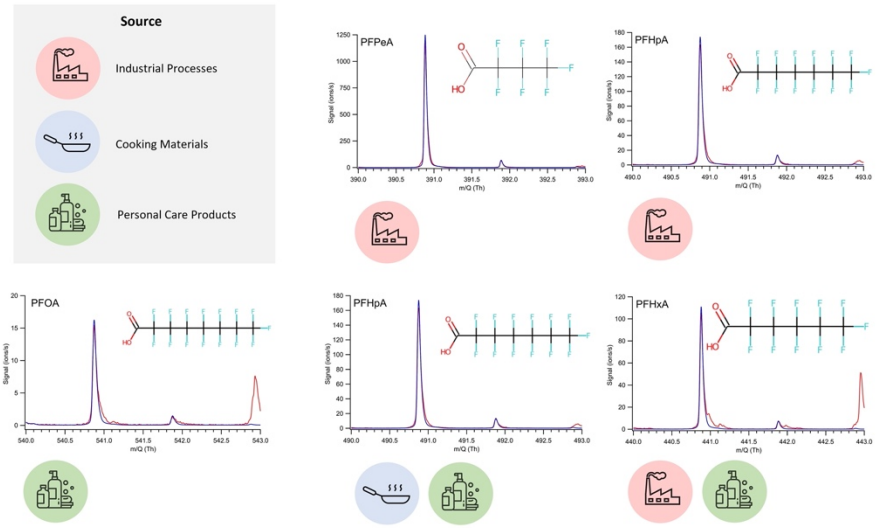

Figure 1. Mass spectra peaks of several PFAS. Red lines: measured spectrum, blue line: calculated isotopic fingerprint for each molecular cluster.

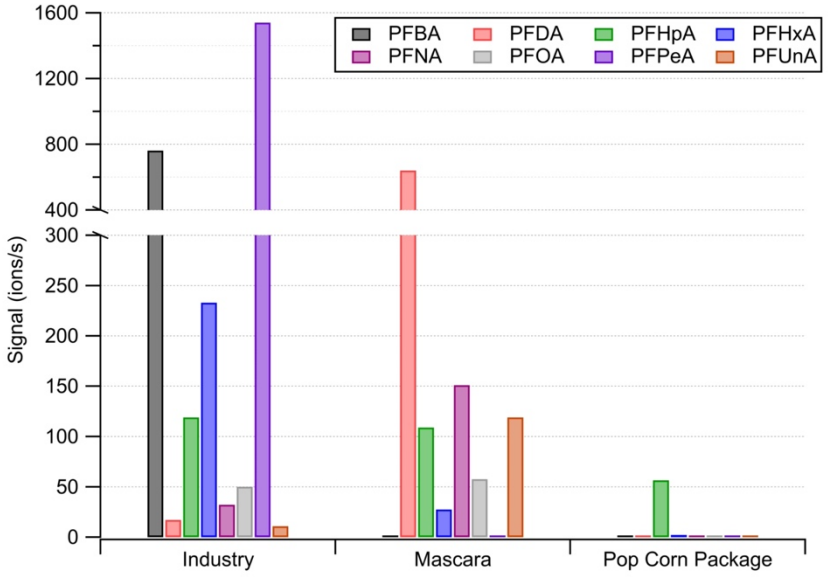

Figure 2. Comparison of PFAS signals in industrial air, waterproof mascara sample headspace, and popcorn sample headspace. Estimated concentrations range from about 5 ppt to 200 pp

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