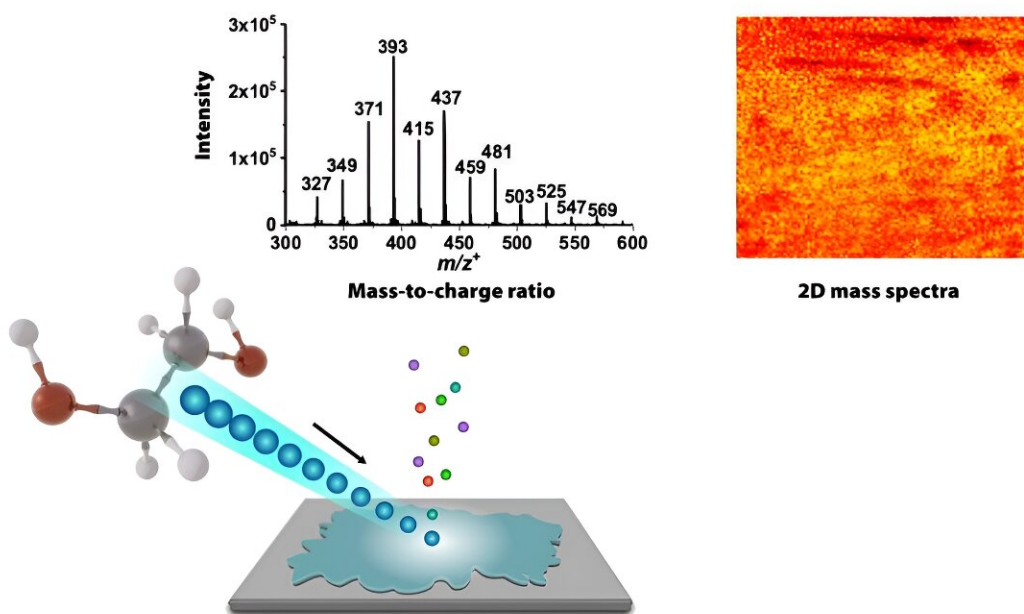


New method detects environmentally unfriendly chemicals

July 30 2024, by Scott Gibson



In time-of-flight analysis, polyethylene glycol is ionized and analyzed for its mass-to-charge ratio, producing 2D mass spectra of the sample surface. Credit: Adam Malin/ORNL, U.S. Dept. of Energy

Substances called polyethylene glycols, or PEGs, are widely used in industry, medical, cosmetics and personal care products. The problem is, when they enter the environment and build up, they can harm ecosystems and natural resources.

Existing approaches to detecting these environmentally unfriendly chemicals—such as chromatography or bulk mass spectrometry—fall short because they lack the necessary sensitivity. However, new research led by Oak Ridge National Laboratory has demonstrated an effective technique for identifying PEGs in the environment.

The study is [published](#) in the journal *Scientific Reports*.

Using time-of-flight mass spectrometry, or ToF-SIMS, a sensitive mass imaging technique, the researchers determined the molecular makeup of PEG structures and pinpointed them in [cosmetic products](#) for the first time. This advancement—finding trace manmade polymers and persistent pollutants—is key in formulating monitoring and restoration strategies.

"Our study's achievement is a stride toward detecting, identifying and monitoring PEGs in the real world because it underscores the applicability of ToF-SIMS in distinguishing [organic pollutants](#) within an intricate environmental context," said ORNL's Xiao-Ying Yu.

More information: Yanjie Shen et al, ToF-SIMS evaluation of PEG-related mass peaks and applications in PEG detection in cosmetic products, *Scientific Reports* (2024). [DOI: 10.1038/s41598-024-65504-4](https://doi.org/10.1038/s41598-024-65504-4)

Provided by Oak Ridge National Laboratory

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