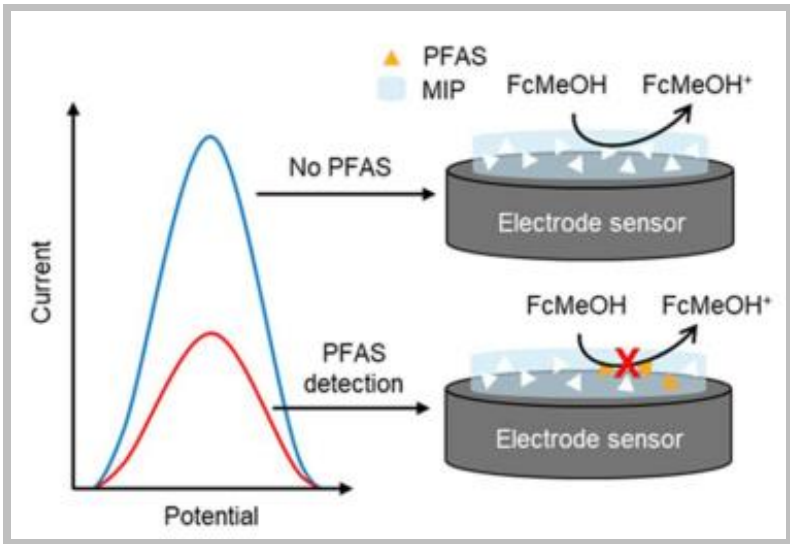
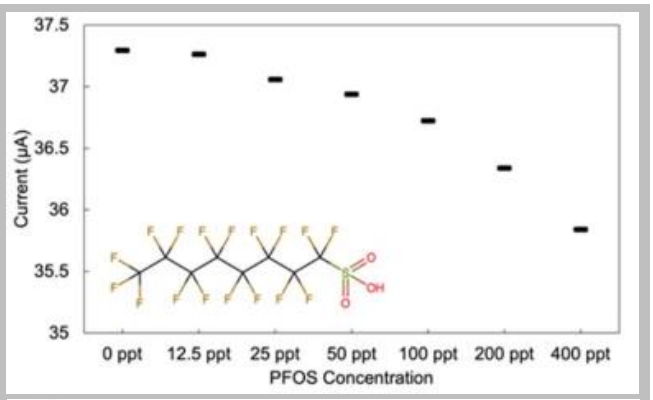
Molecularly Imprinted Polymer (MIP)-Based Electrochemical Sensors for Rapid, On-Site PFAS Detection





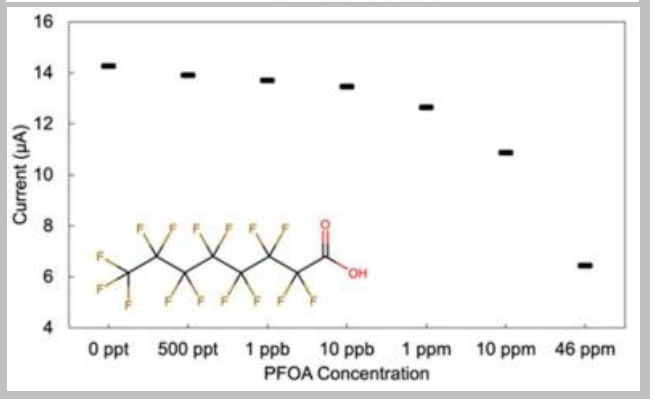


Figure 1. Left: A depiction of the impedence based detection of PFAS. The signal is reduced in the presence of PFAS by blocking access to the electrode.The reduction in signal is proportional to PFAS concentration. Right: Sensing curves for two common PFAS, PFOS and PFOA. Each can be detected from parts per trillion (ppt) to parts per million (ppm).

Per- and polyfluorinated alkyl substances (PFAS) are a class of man-made industrial chemicals that have found their way into soil, groundwater, and surface water and represent a human health risk at very low exposure. These chemicals do not degrade naturally over time, instead requiring significant effort to remove from the environment.

On-site Screening for Multiple PFAS within Minutes

Currently, PFAS measurements at the parts per trillion (ppt) level cannot be completed in the field. Samples must be collected and shipped to an accredited laboratory to perform analysis. The volume of testing required has resulted in significant backlogs, sometimes months at a time. The MITRE PFAS sensor will not replace this accredited testing, but instead serve as an on-site screening tool.

MITRE's sensor utilizes MIPs to produce a highly selective binding interaction for PFAS analytes to allow detection. This produces an impedence based sensor, with signal reduction being proportional to PFAS concentration in the sample. Limits of detection on the order of 10s of ppt have been demonstrated in PFAS spiked water samples in the laboratory.

The PFAS sensor is intended to provide real-time measurements to scope PFAS-impact, quantify PFAS destruction, or warn for breakthrough in PFAS filtration systems.

For information about MITRE's PFAS sensor, contact joeroberts@mitre.org.

For information about MITRE's broader PFAS portfolio, contact rhollins@mitre.org.

"The goal is to screen for PFAS-impact on-site, within minutes, and quickly determine if you have a problem."

Joe Roberts, Ph.D.

This material is based upon work supported by the United States Air Force FA8649 USAF RESEARCH LAB AFRL SBRK under Contract No. FA864923P0410

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