US Army Corps of Engineers®
Engineer Research and Development Center

Facility

Fluorescence Spectroscopy Laboratory (FSL)

Purpose

The Fluorescence Spectroscopy Laboratory (FSL) at ERDC-TEC is engaged in basic and applied research in fluorescence sensing focused on the development and testing of fluorophores for recovery by remote sensing. The FSL guides the development and testing of organic (living) and inorganic materials that may be used for the detection and mapping of harmful agents or environmental threats of relevance to the Warfighter. The goal of the laboratory is integrated "smart" sensing to support the Objective Force.

Specifications

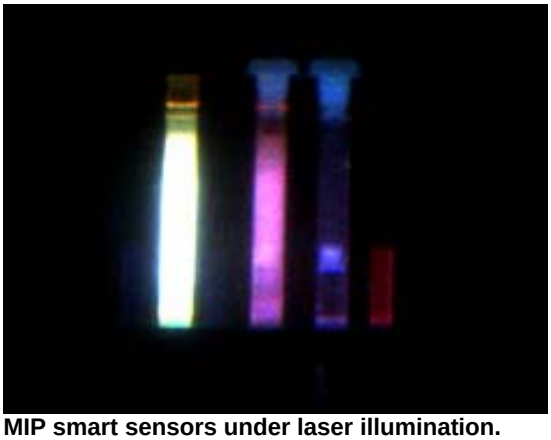
The FSL has the capabilities to measure both steady-state and lifetime (decay) fluorescence spectra for fluorophores using state-of-the-art spectrometers including a frequency-domain lifetime spectrofluorometer that can measure fluorescence decays in picosecond lifetimes. The laboratory is also engaged in the characterization of near infrared fluorophores using a femtosecond pulse Ti:Sapphire laser. The laboratory also supports imagery-based fluorescence measurements using laser-induced fluorescence and passive fluorescence measurements by Fraunhofer Line Discrimination. These measurements support defense, intelligence, and mapping agencies with baseline research in polymer detection, backgrounds, and characterization of fluorophores for environmental analysis.

Benefits

FSL's precision fluorescence measurements assist in the development and synthesis of specific fluorophores by customers needing to test sensing characteristics of fluorescent reporters. FSL research in synthesis of fluorescent molecular (optical) imprinted polymers and proteins has led to novel ways to improve signal to noise levels in fluorophores (improved quantum efficiency) for recovery by synoptic sensors. In collaboration with government and academia, the laboratory has been leading the measurement of fluorophore efficiency for operational remote sensing. These measurements are critical to developing fluorophore labels possessing signals that are strong and survivable.

Success Stories

Recent work has involved synthesis of a fluorescent molecular imprinted polymer sensors for biological agent / constituent detection and prototype fluorescence-powered smart sensors. FSL research has also used laser-induced fluorescence imaging to sense chemical, biological, and radiological molecular imprinted polymer (MIP) sensors in support of national programs. This technique lays the foundation for active synoptic remote sensing for a wide array of contaminants relevant to operational military and homeland defense.



MIP smart sensors under laser illumination.

Point of Contact

Dr. John Anderson, COMM (703) 428-6698, or e-mail:
John.Anderson@usace.army.mil