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SIU Southern Illinois University
CARBONDALE

MASS SPECTROMETRY FACILITY

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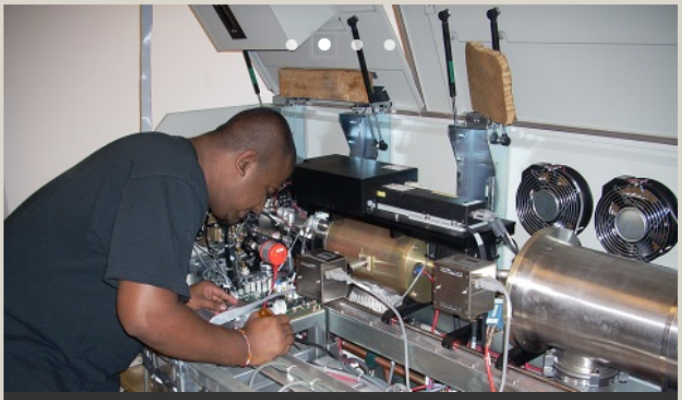


ABI 4700 Proteomics Analyzer

The Facility owns and operates several high-performance mass spectrometers to support basic research efforts throughout Southern Illinois University. The Facility offers training for independent operation of instruments as well as sample analysis by Facility personnel. The Facility's services are also open to external academic institutions and industry.

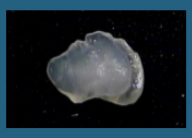
This website serves as a guide to the Facility, its services, and its research and teaching activities. The website offers an overview of the Facility's instrumentation and methods in order to assist your search for a suitable method.

The Mass Spectrometry Facility is located in the Department of Chemistry & Biochemistry.

Research Spotlight

Dr. Liliana Lefticariu talks about her latest work researching the stable isotopes of elements and what relevance this has for education and training.

Research Spotlight



Dr. Greg Whitledge studies otolith stable isotope and elemental compositions as indicators of fish environmental history.

Facility Supports REACH Awards

William R. Kipp, a senior geology major, will use stable isotope analysis in his REACH project titled "Rare Earth Element Distribution in Fluorite From Around Hick's Dome." His faculty mentor is Liliana Lefticariu, assistant professor of geology.

HELPFUL LINKS

- Stable Isotope Reference Materials
- ISOGEOCHEM
- IAEA
- American Society for Mass Spectrometry
- MASCOT Search

MS FACILITY PARTICIPATES IN THE 2013 LGC STANDARDS PROFICIENCY TESTING

2013 LGC STANDARDS PROFICIENCY TESTING PROGRAM

In May and October 2013 the SIUC Mass Spectrometry Facility participated at the rounds 203 and 209, respectively, of the Forensic Isotope Ratio Mass Spectrometry Proficiency Testing scheme organized by the LGC Standards. The stable isotopes ratios of N, C, H, and O were determined in chitin, hemp, hydrocarbon oil, and olive oil. The advantages of participating in this proficiency testing scheme were:

1. The analytical results obtained by the facility were compared to those of other laboratories throughout the world (inter-laboratory comparison).

2. Analytical results obtained on duplicates were compared to those obtained on originals (intra-laboratory comparison).

3. The materials analyzed have become certified laboratory standards.

INSTRUMENTATION

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INSTRUMENTATION OVERVIEW

Thermo Scientific DeltaV Plus Isotope Ratio MS

Thermo Scientific TraceGC PolarisQ GCMS

Bruker Daltonics MicroflexLR TOFMS

Applied Biosystems Inc. 4700 Proteomics Analyzer

Bruker Daltonics Esquire HCT MS

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Sample Analysis by Facility Personnel

Facility personnel routinely analyze submitted samples (see services listed below). Guidelines and forms for sample submission are found under "Protocols" and "Sample Submission". Please note that the Facility is not equipped or licensed to handle radioactive and biohazardous samples.

A. IRMS: Stable isotopes $\delta^{13}C$, $\delta^{15}N$, $\delta^{2}H$ and $\delta^{18}O$ for both solids and liquids.
B. GC-MS: Mass spectrometric analysis of mixtures of volatile compounds.
C. MALDI - TOFMS: Generation of peptide mass fingerprints followed by public database searching or intact protein molecular weight determination.
D. MALDI - TOF/TOFMS: The use of collision induced dissociation (CID) to fragment and sequence peptide ions. The MS/MS spectral data can then be searched against public databases for protein identification.
E. Direct infusion Electrospray MS: Syringe pump used to infuse solution of pure sample for mass spectrometric analysis. Note: Not appropriate for complex mixtures.
F. HPLC- Electrospray MS or MS/MS: HPLC separation combined with mass spectrometric (MS) analysis or the use of collision induced dissociation (CID) in various types of MS/MS experiments to detect product ions, to scan for parent ions that form a specific product ion, or to screen for the loss of neutral fragments.

Use of Instruments by Trained Investigators

Instruction on the use of Facility instruments is available. Training involves lecture and hands-on experience with the instruments (usually 2.5 - 8 hours). After approval by the instructor (Application for Training (PDF format)), the investigator is expected to operate the instruments with minimal guidance from Facility personnel. Refer to "Rates" for the cost of training.

The Facility offers training on gas chromatography - mass spectrometry (GC-MS) and matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI TOFMS). GC-MS allows for the separation and subsequent detection of volatile, small molecular weight compounds (< 800 Da) with the production of electron impact (EI) mass spectra. MALDI TOFMS is routinely used for the analysis of peptides and proteins. Peptide analysis is performed on the ABI 4700 Proteomics Analyzer and intact protein analysis is performed on the Bruker Daltonics Microflex. Both positive and negative ions can be detected on either instrument. These features provide the necessary flexibility to optimize each analytical method for individual samples.