ISO-TOPICS: THE FIRMS NETWORK NEWSLETTER

October 2024

ABOUT US

The Forensic Isotope Ratio Mass Spectrometry (FIRMS) Network was founded to develop the scope of stable isotope techniques in forensic applications.

FIRMS brings together chemists, physicists, materials scientists, and life scientists who employ isotopic analysis in their respective fields. FIRMS is helping to focus collective knowledge and expertise on improving methods for crime detection and reduction.

We look forward to seeing you in person at the 2025 conference of the FIRMS Network, in London.

WELCOME

Welcome to the FIRMS October 2024 newsletter.

DISCLAIMER

Reference to or mention of any commercial product or process by specific trademark or manufacturer within this newsletter does not necessarily represent an endorsement by the FIRMS Network.

IN MEMORIAM: DR. KEITH ALAN HOBSON

Keith Hobson passed away 2 October 2024 at the age of 70, following a brief battle with cholangiocarcinoma (bile duct cancer). From his obituary: "Keith was a pioneering figure in isotope ecology, contributing to the understanding of food webs and the migration of insects, birds, and mammals through innovative isotope analysis. His work spanned ecosystems from the Arctic to the Antarctic, including every province and territory in Canada. His groundbreaking research fundamentally transformed our knowledge of animal migration and dietary ecology, influencing conservation efforts worldwide." One of his most influential papers was published in 2005, on the utility of hydrogen and oxygen isotopes in wildlife forensic applications (https://link.springer.com/article/10.1007/s00442-004-1813-y).

The FIRMS Network extends its deepest condolences to the family and friends of Dr. Keith Hobson.

Keith was a good friend to many FIRMS members, past and present, and will be sorely missed. Per his obituary, Dr. Hobson requested that those wishing to honor his memory should plant a tree.

UPDATES FROM THE STEERING GROUP

Save the date for the **9th Conference of the FIRMS Network**! The meeting will take place 15-18 September 2025 at Burlington House, The Royal Society of Chemistry, London, UK. Details will follow shortly on the website.

Steering Group Members **Phil Dunn and Ethan Strak have produced three recordings** on topics of interest to the FIRMS Network, including traceability of isotope ratio measurements, the preparation of in-house reference materials, and isotope data quality assurance. These recordings are freely available via a OneDrive link.

Suggestions for additional videos on topics of interest to members of the FIRMS Network are welcome!

As noted previously, prior to the 2025 conference the Steering Group plans to publish a **3rd edition of the GPG** (*Good Practice Guide for Isotope Ratio Mass Spectrometry*). Suggested edits can be submitted to gpg@forensic-isotopes.org. A database guide is also in development, for publication in 2025.

NEWS AND NOTICES

Following Paris 2024, Elementar published a brief history of **doping at the Olympic Games** on its blog. Isotope ratio mass spectrometry is mentioned as one of the tools used to detect synthetic steroids.

Please save the date for **JESIUM 2025** (Joint European Stable Isotopes Users group Meeting)! It will be held 16-20 June 2025 in Groningen, the Netherlands. Details are available online at https://jesium2025.org.

The IAEA has announced a planned **Advanced Training Course on Data Processing and Interpretation Applied to Isotope Hydrology Studies**, which will take place in September 2025. Additional information should be coming soon (https://www.iaea.org/events/evt2303865).

HIGHLIGHTED PUBLICATIONS

As detailed in the October 2021 Newsletter, LSVEC lithium carbonate has been withdrawn as a carbon isotope ratio reference material due to a stability issue from exchange of carbon with atmospheric CO_2 that led to variations in its carbon isotope delta values. Subsequently, the IAEA has released a series of additional carbonate reference materials for normalising carbon isotope delta values on the VPDB scale. However, normalisation using these new reference materials has been shown to result in biased carbon isotope delta values. Recently, FIRMS Director Phil Dunn and FIRMS Member Federica Camin published a summary of three proposals for addressing this bias and dealing with the "LSVEC Problem" (https://analyticalsciencejournals.onlinelibrary.wiley.com/doi/10.1002/rcm.9841).

A special issue of *TrAC Trends in Analytical Chemistry* entitled Advances in Stable Isotopes is currently being published. Articles already available that include a FIRMS member as an author are marked with an asterisk (*) in the below list.

PUBLICATIONS LIST

Disclaimer: This section contains a non-comprehensive list of recent publications that may be of interest to members. Inclusion does not necessarily mean that the FIRMS Network approves the content. You are encouraged to consider critically whether (i) the experimental work complies with SI guidelines and the Good Practice Guide; and (ii) the conclusions drawn are based on sound scientific background information.

Balint S, Schwartz M, Fowler DN, et al (2024) Experimental assessment of elemental analyzer isotope ratio mass spectrometry normalization methodologies for environmental stable isotopes. Rapid Comm Mass Spectrometry 38:e9837. https://doi.org/10.1002/rcm.9837

Cui L, Chen H, Han S, et al (2024) Stable isotope profiling of cigarettes assisted with chemometrics for authenticity determination. Microchemical Journal 201:110709. https://doi.org/10.1016/j.microc.2024.110709

De Coster M, Ammer S, Laning T, Kootker LM (2024) The relevance of Sr–O–C isotope analysis on burnt human skeletal remains in archeological and forensic contexts: A review and future directions. WIREs Forensic Science e1524. https://doi.org/10.1002/wfs2.1524

Dunn PJH, Camin F (2024) The 'LSVEC problem' for the Vienna Peedee Belemnite carbon isotope-delta scale. Rapid Comm Mass Spectrometry 38:e9841. https://doi.org/10.1002/rcm.9841

Dunn PJH, Malinovsky D, Ogrinc N, et al (2024) Re-determination of *R* ($^{13}C/^{12}C$) for Vienna Peedee belemnite (VPDB). Rapid Comm Mass Spectrometry 38:e9773. https://doi.org/10.1002/rcm.9773

Foecke KK, France CAM, Brooks AS (2024) Experimental assessment of the impact of food processing on $\delta^{15}N$ values in dietary meat – Implications for paleodietary reconstruction. Journal of Archaeological Science 169:106024. https://doi.org/10.1016/j.jas.2024.106024

*Giannioti Z, Ogrinc N, Suman M, et al (2024) Isotope ratio mass spectrometry (IRMS) methods for distinguishing organic from conventional food products: A review. TrAC Trends in Analytical Chemistry 170:117476. https://doi.org/10.1016/j.trac.2023.117476

Gordon GW (2024) Carbon isotope evaluation of the claims in MillerCoors vs Anheuser-Busch. Forensic Chemistry 100598. https://doi.org/10.1016/j.forc.2024.100598

Honesova L, Viaene W, Van Eenoo P, Polet M (2024) High-temperature liquid chromatography-isotope ratio mass spectrometry methodology for carbon isotope ratio determination of anabolic steroids in urine. Analytica Chimica Acta 1324:343092. https://doi.org/10.1016/j.aca.2024.343092

Hu C, Huang Y, Mei H, et al (2024) Investigation of isotopic linkages between raw materials and black powder. Journal of Forensic Sciences 1556-4029.15615. https://doi.org/10.1111/1556-4029.15615

Li Z, Liu B (2024) Two-dimensional high performance liquid chromatography purification of underivatized urinary prednisone and prednisolone for compound-specific stable carbon isotope analysis. Analyst 149:4899–4907. https://doi.org/10.1039/D4AN00690A

Malinovsky D, Dunn PJH, Rooke P, Goenaga-Infante H (2024) The effect of roasting on boron isotope ratio in coffee beans: Implications for provenance studies of roasted coffee. Food Chemistry 439:138128. https://doi.org/10.1016/j.foodchem.2023.138128

Meikle J, Jones K, Cresswell SL, et al (2024) The effects of fingerprinting agents on the stable isotope ratios of polyethylene films. Science & Justice 64:599–604. https://doi.org/10.1016/j.scijus.2024.09.001

Nash ALN, Newsome SD, McMahon KW (2024) On precision and accuracy: A review of the state of compound-specific isotope analysis of amino acids. Organic Geochemistry 195:104823. https://doi.org/10.1016/j.orggeochem.2024.104823

Novais LMRD, Melara VK, Salome KS, et al (2024) Investigation of fraud in the production of butter: A forensic case study of criminal association. Food Additives & Contaminants: Part A 41:1219–1231. https://doi.org/10.1080/19440049.2024.2387191

*Perini M, Pianezze S, Bontempo L (2024) Stable Isotope Ratio Mass Spectrometry and Site-Specific Natural Isotope Fractionation-Nuclear Magnetic Resonance applications to discriminate between synthetic and natural analogs: A review. TrAC Trends in Analytical Chemistry 180:117966. https://doi.org/10.1016/j.trac.2024.117966

Ricciardi M, Pironti C, Comite V, et al (2024) A multi-analytical approach for the identification of pollutant sources on black crust samples: Stable isotope ratio of carbon, sulphur, and oxygen. Science of The Total Environment 951:175557. https://doi.org/10.1016/j.scitotenv.2024.175557

This newsletter was compiled and edited by Lesley Chesson. It was created using a Microsoft® Word template.

Have Feedback? Contact Us

FIRMS Network
news@forensic-isotopes.org
forensic-isotopes.org

*Roncone A, Kelly SD, Giannioti Z, et al (2024) Stable isotope ratio analysis: an emerging tool to trace the origin of falsified medicines. TrAC Trends in Analytical Chemistry 174:117666. https://doi.org/10.1016/j.trac.2024.117666

Scaggion C, Marinato M, Dal Sasso G, et al (2024) A fresh perspective on infrared spectroscopy as a prescreening method for molecular and stable isotopes analyses on ancient human bones. Sci Rep 14:1028. https://doi.org/10.1038/s41598-024-51518-5

Shipley ON, Dabrowski AJ, Bowen GJ, et al (2024) Design, development, and implementation of IsoBank: A centralized repository for isotopic data. PLoS ONE 19:e0295662. https://doi.org/10.1371/journal.pone.0295662

Stantis C, Schaefer BJ, Correia MA, et al (2024) Ethics and applications of isotope analysis in archaeology. American Journal of Biological Anthropology e24992. https://doi.org/10.1002/ajpa.24992

Tarrant D, Richards MP (2024) Modern plants and sulfur isoscapes — A review, discussion, and construction of a pilot $\delta^{34}S$ isoscape for mobility and provenance studies. Rapid Comm Mass Spectrometry 38:e9908. https://doi.org/10.1002/rcm.9908

Wang Y, Fan J, Fang X, et al (2024) Two-dimensional liquid chromatography purified GC/C/IRMS doping control method: Analysis of endogenous and exogenous sources in urine samples from Asian subjects administered a low dose of AICAR. Journal of Chromatography A 1735:465312. https://doi.org/10.1016/j.chroma.2024.465312

Whitman G, Messner J, Johnson RC, et al (2024) Forensic geochemistry identifies the illegal introduction of Walleye into Lake Cascade, Idaho. N American J Fish Manag 44:407–414. https://doi.org/10.1002/nafm.10985