



**ThermoFisher**  
S C I E N T I F I C

**Expand Your Capabilities Without Getting Boxed In**  
A flexible EA Platform that grows with you

Oliver Kracht  
*Applications Manager*  
*Thermo Fisher Scientific Bremen, Germany*

The world leader in serving science



1. Thermo Scientific EA Platform
2. New EA IsoLink OH Configuration
3. Analytical Performance

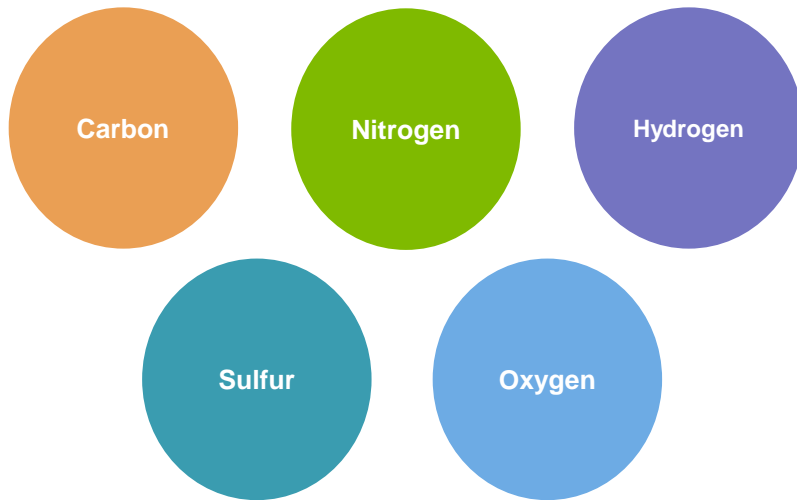


## 1. Thermo Scientific EA Platform

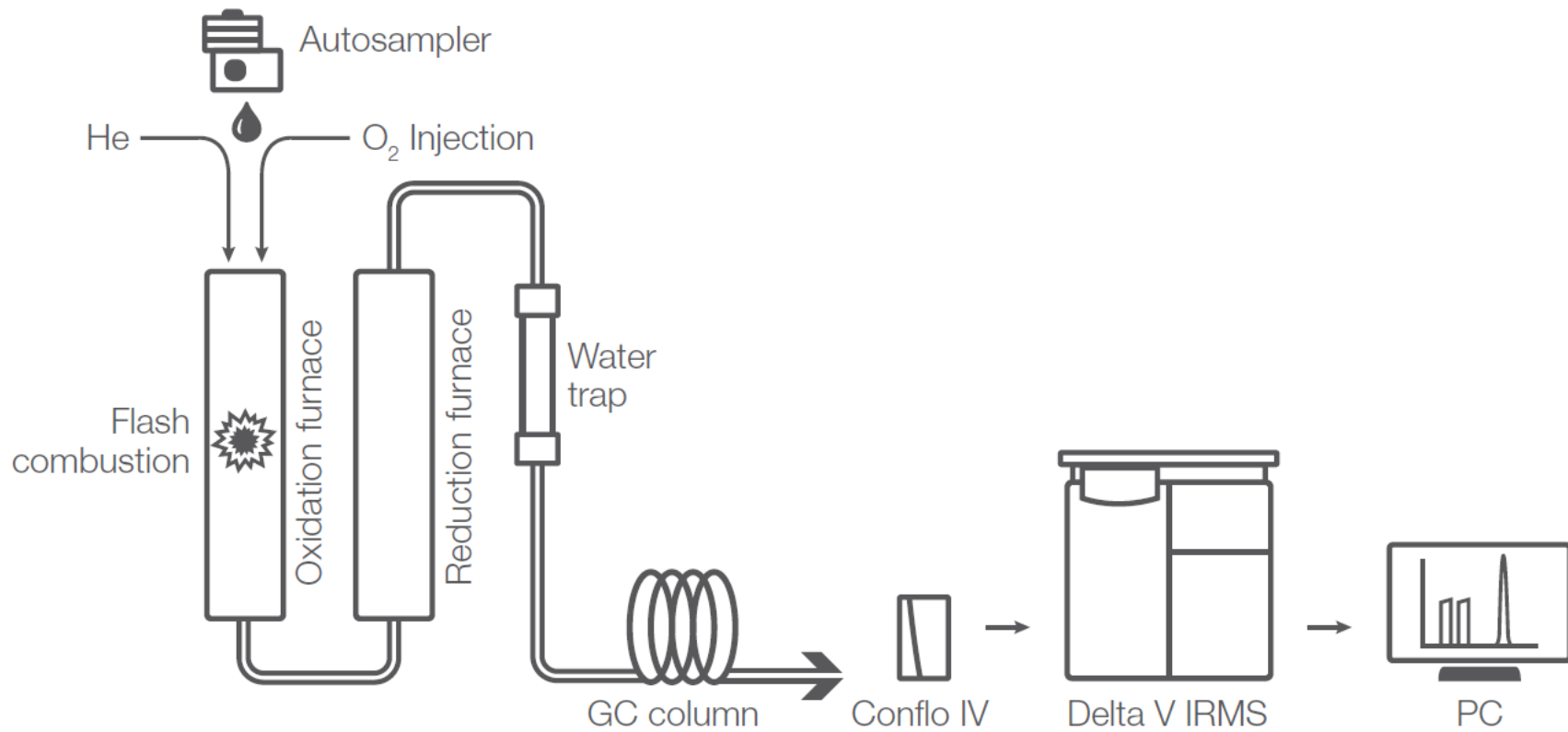
# All Your Elemental Analysis On One Platform

**More freedom. More flexibility.**

The **Thermo Scientific EA IsoLink IRMS System** is an automated, easy-to-use solution for bulk isotopic analysis of:



# EA IsoLink IRMS System Overview





# EA IsoLink IRMS System Features



**Ease of Use** with Thermo Scientific™ smartEA™ Option



**Reduced operational costs** through Helium Management (He<sup>M</sup>) Module



**High Sensitivity mode** for **higher productivity**



# EA Platform Portfolio and Configurations



## CN(S), CN(S)/OH

A powerful solution for CN, OH analysis – upgradeable for S analysis



## CNSOH

A fully automated single system for CNS analysis by flash combustion, and OH analysis by HT conversion



## FlashSmart

Organic Elemental Analyzer for analysis of CHN, S, N/Protein, CNS, CHNS/O and many more



## OH

Dedicated oxygen and hydrogen testing – with scalability to C, N and S

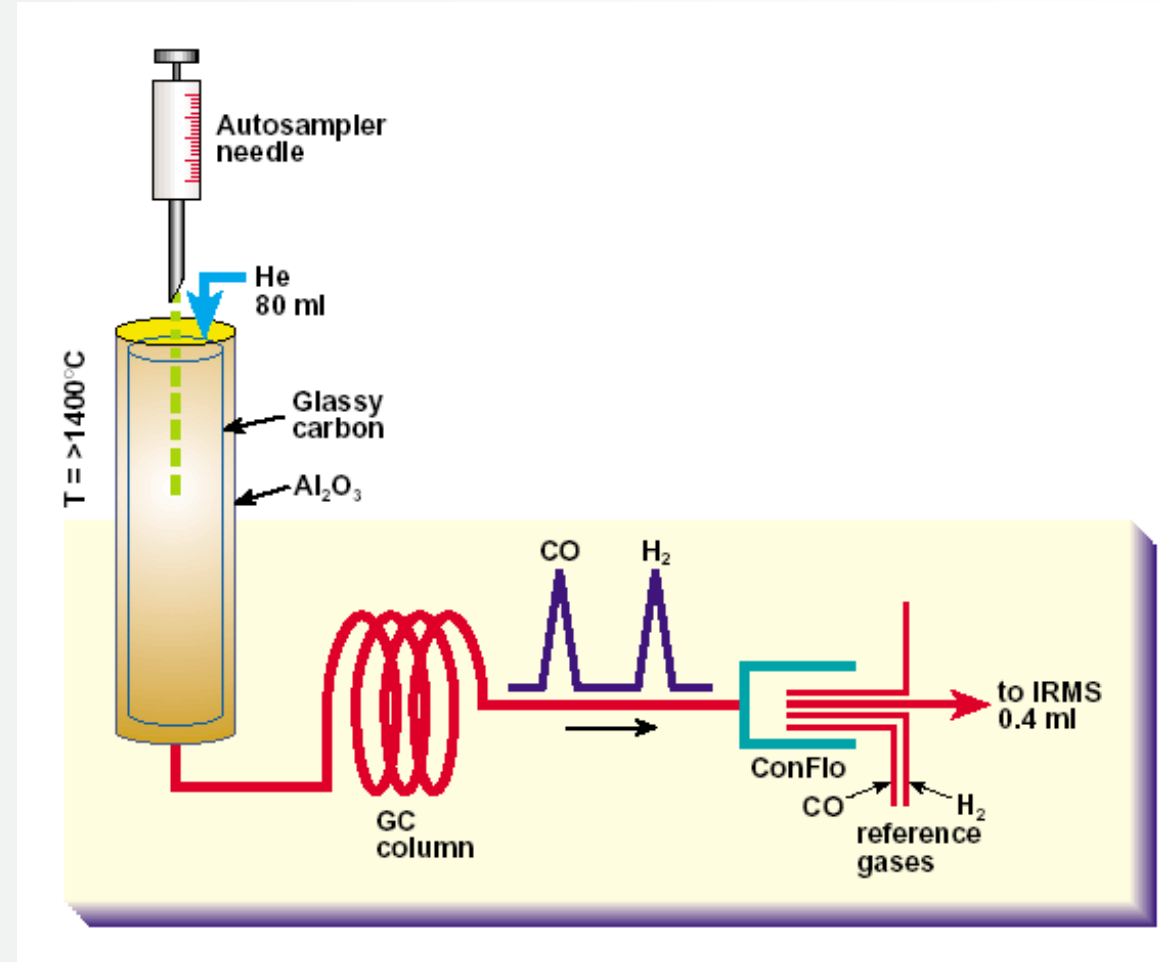


## 2. New EA IsoLink OH Configuration



# OH Configuration

- Continuous-flow IRMS for online oxygen and hydrogen isotope ratio analysis
- High-temperature pyrolysis to convert oxygen to CO and hydrogen to H<sub>2</sub>
- Delivers answers on origin of samples and environmental processes



# TC/EA is now EA IsoLink OH Configuration!

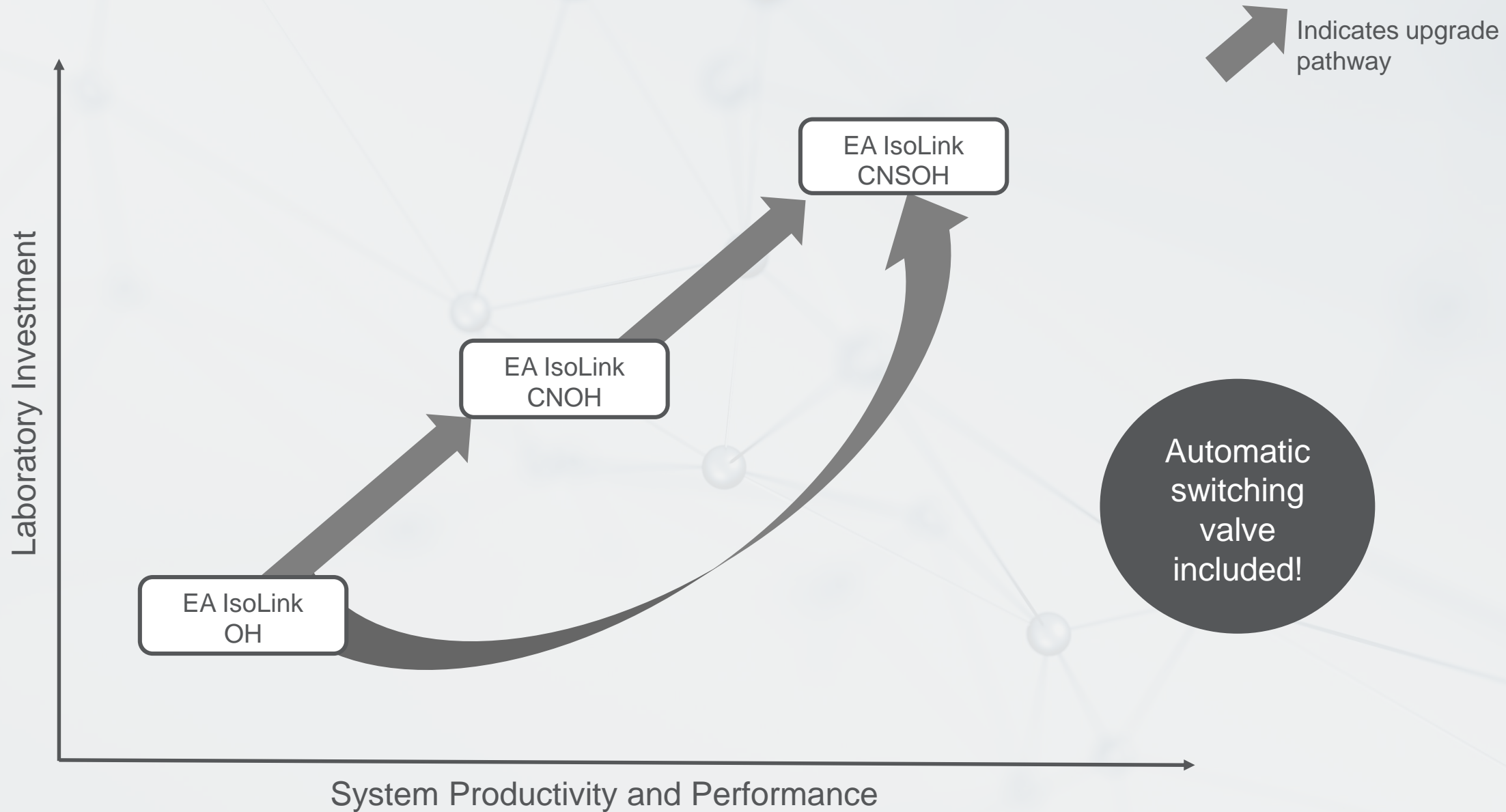


# OH Configuration

- ✔ Complete automation including auto-stop, wake-up and standby modes, and time sequence starts
- ✔ Software readbacks of furnace and GC column temperature, analysis status and gas flows
- ✔ Upgradeability for additional CN(S) functionality with Automatic Switching Valve between OH and CN(S) configuration



# Full Scalability from OH to CN(S)OH





## OH configuration includes:

- New column for better peak resolution
- MAS Plus autosampler comprising a 32 position drum
- Bottom Feed Connector

## Optional:

- smartEA Option
- Kits for CN and CNS upgrades



thermoscientific

Expand your capabilities without getting boxed in

A flexible EA-IRMS platform that grows with you

Thermo Scientific EA IsoLink IRMS Platform

ThermoFisher  
SCIENTIFIC

The advertisement features a photograph of a scientist in a white lab coat and safety glasses working with a piece of laboratory equipment. The background is a clean, modern laboratory setting. The text is overlaid on the image, with the ThermoFisher Scientific logo at the bottom right.



## 3. Analytical Performance

# Addressing a World of Applications for Origin and Authenticity Analysis

## Food Authenticity

- Foods adulteration and origin
- Agronomy



## Geoscience

- Soil Science
- Paleoclimatology research



## Environmental

- Marine Science
- Ecology and Biology
- Petroleum

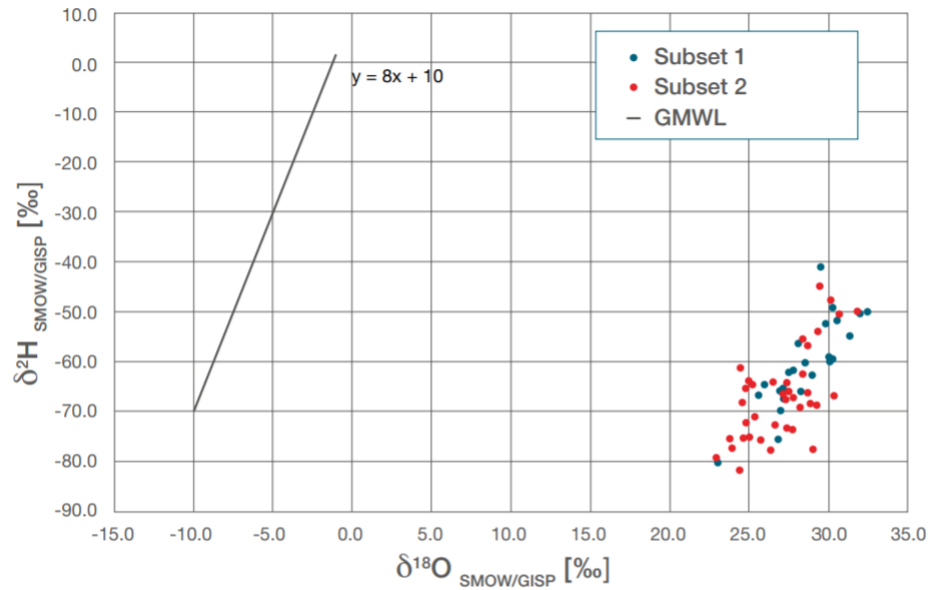


## Forensics

- Archeology
- Provenance



# EA IsoLink OH Configuration - Analytical Performance



- 2-dimensional plot of stable isotope ratios of oxygen and hydrogen from 69 rice samples.
- Two subsets are indicated by color, each from a growing region at different altitude.

thermo scientific

APPLICATION BRIEF

No. 30663

## EA-IRMS: Characterizing Himalayan rice of different origin by oxygen and hydrogen isotope fingerprints

Authors: Oliver Kracht, Christopher Brodie  
Thermo Fisher Scientific, Bremen, Germany

Keywords: Adulteration, beverage, hydrogen, isotope fingerprints, origin, oxygen, rice

### Goal

Illustrate how isotope fingerprints support further investigation on mislabeling and food fraud, by providing a framework for study of provenance of rice using oxygen and hydrogen isotopes.

### Introduction

Rice, a cereal grain, is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). It is considered staple food for a large part of the world's human population, especially in Asia.

Basmati rice is a variety of long, slender-grained aromatic rice which is traditionally from the Indian subcontinent and it is unique for its natural smell provided by the aroma compound 2-acetyl-1-pyrroline. Legally, the term basmati rice can be only used for perfumed rice grown in specific regions of India and Pakistan, which limits its availability on the market.



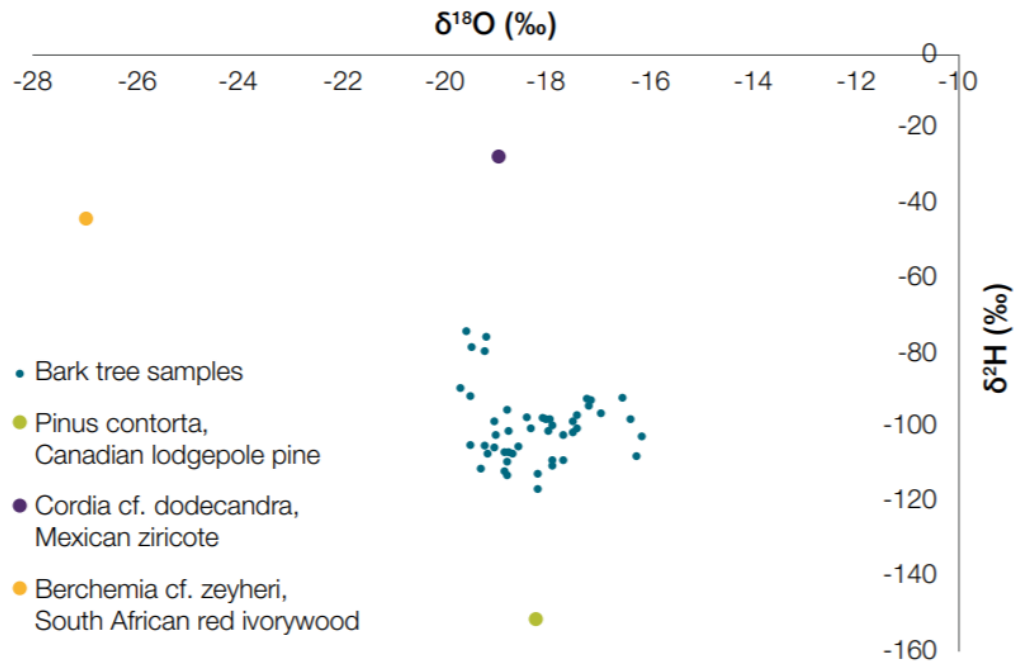
This uniqueness has contributed to make basmati rice the center of food fraud activities by means of mislabeling or contamination with inferior long-grain rice. Consequently, mislabeled rice enters the food market affecting producers and consumers' trust.

Distinguishing authentic products by geographical origin is one of the challenges in food industry. Since origin is often associated with quality and price, products with high commercial values are a target of criminal activity.

ThermoFisher  
SCIENTIFIC



# EA IsoLink OH Configuration - Analytical Performance



Combined O and H isotope fingerprints of tree bark samples and wood reference material.

Reference material	Measured $\delta^2\text{H}$ (‰)	SD	Certified $\delta^2\text{H}$ (‰)	Measured $\delta^{18}\text{O}$	SD	Certified $\delta^{18}\text{O}$
USGS 54	-151.64	0.82	-150	-18.23	0.36	17.8
USGS 55	-27.20	3.26	-28	-18.95	0.14	19.1
USGS 56	-44.11	0.76	-44	-26.97	0.09	27.2

**thermo scientific**

APPLICATION BRIEF No. 30662

## EA-IRMS: Tracing geographical origin of timber using oxygen and hydrogen isotope fingerprints

Authors: Oliver Kracht, Christopher Brodie, Thermo Fisher Scientific, Bremen, Germany

Keywords: Criminal forensics, illegal traffic, isotope fingerprints, origin, oxygen, timber, wood


**Goal**  
 Illustrate how isotope fingerprints provide a framework for the provenance of wood using oxygen and hydrogen isotopes.

**Introduction**  
 Exotic types of wood have become an object of world's illegal traffics. Their wide usage for luxurious furniture, souvenirs, to housing commodities has resulted in fraudulent activities and illegal trade worth billions of dollars every year, as reported by Interpol<sup>1</sup>. Besides negative economic effects on impacted countries, illegal wood trafficking is responsible for environmental damage, due to its unsustainable approach to wildlife, often harming endangered animal and plant species. In order to fight criminal groups exploiting high-value woods, international efforts are put in place for identification of timber species and their geographic origin. Certificates for timber wood

have been introduced to prove sustainability and legality of forest cultivation (e.g. EU timber regulation No 995/2010).

Tracing back the origin of wood species can be done by investigating their isotope fingerprints. Oxygen and hydrogen isotope fingerprints can help identify geographical origin.

This application brief reports oxygen and hydrogen analysis of 25 different types of tree bark. Three international certified isotopic reference wood materials have been analyzed to demonstrate the precision and accuracy of the elemental analyzer for wood analysis.



**ThermoFisher**  
SCIENTIFIC

# A flexible EA platform that grows with you.

- ✓ Complete automation/complete software control
- ✓ Scalability
- ✓ Helium Management System and smartEA Option

[thermofisher.com/EAPatform](https://thermofisher.com/EAPatform)



# Q&A

Thank you for your attention.

