TECHNOLOGY OFFER

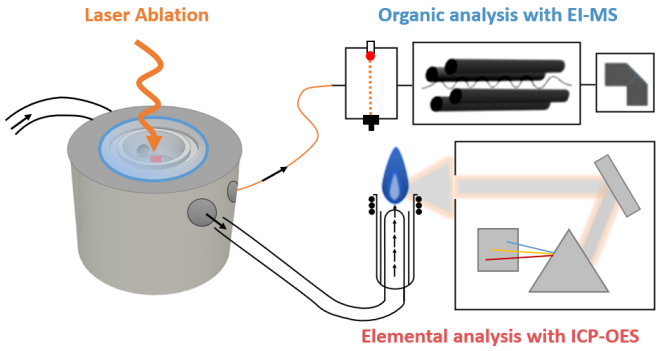
Spatially Resolved Characterization of Organic Materials

The increasing use of organic materials in industries necessitates precise characterization. Our innovative combination of Laser Ablation with Electron Impact Mass Spectrometry (LA-EI-MS) enables direct and comprehensive characterization of solid samples. This approach provides spatially resolved insights, offering a deeper understanding of material composition and enabling layer-by-layer depth profiling.

BACKGROUND

Traditional organic analysis methods, like LC-MS or GC-MS, offer information on material composition but involve time-consuming sample pretreatment. Direct solid sample analysis methods such as FTIR, MALDI-MS, or Pyrolysis-GC-MS eliminate the need for extensive preparation but only provide surface or bulk composition details. Our novel LA-EI-MS method overcomes these limitations, allowing for spatially resolved insights into structured or heterogeneous samples.

TECHNOLOGY



Pic 1. Schematic illustration of novel ablation cell combined with EI-MS and ICP-OES

The heart of the invention is an ablation cell mounted on a movable sample stage. Within this cell, a sample is exposed to a fine focused laser beam through an optical window. The ablated sample material and its reaction products are efficiently transferred by a constant inert gas flow to an EI-MS for analysis. A second analysis device can be operated in parallel to determine the elemental composition, e.g. by using inductively coupled plasma optical emission spectroscopy (ICP-OES). The controlled movement of the sample stage allows a systematic and spatially resolved examination of the sample surface. Given the method's invasive nature, repetitive laser ablation at the same sample spot provides insights into subsurface layers, enabling the determination of the sample's vertical composition through depth profiling. This goes beyond merely qualitatively establishing the statigraphy and concentration profiles; ideally, it involves the identification of the compounds present. This pioneering advancement in organic material analysis holds particular appeal for examining structured samples like coatings or laminates.

BENEFITS

- Detailed spatial analysis of composites, covering surface and subsurface aspects.
- Fast responses for critical concerns.
- Enhanced sample processing efficiency, automation potential for high-throughput.
- Improved comprehension of material properties, especially for non-uniform composites like coatings and laminates.

WISSENS/ TRANSFER/ OST/

www.wtz-ost.at

REFERENCE:
M015/2021

APPLICATIONS:
Analysis of Coatings and Laminates

DEVELOPMENT STATUS:
TRL 4

KEYWORDS:
Laser Ablation Mass Spectrometry, Spatially Resolved Organic Analysis, Depth Profiling in Material Analysis

IPR:
AT Patent granted, EP and US filed

INVENTORS:
Andreas Limbeck, Erwin Rosenberg, Johannes Frank, Laura Kronlachner

CONTACT:

Raphael PRUCKNER

TU Wien
Research and Transfer Support
Karlsplatz 13/E058-02, Wien
T: +43.1.58801.415247
raphael.pruckner@tuwien.ac.at

TU WIEN TECHNISCHE UNIVERSITÄT WIEN