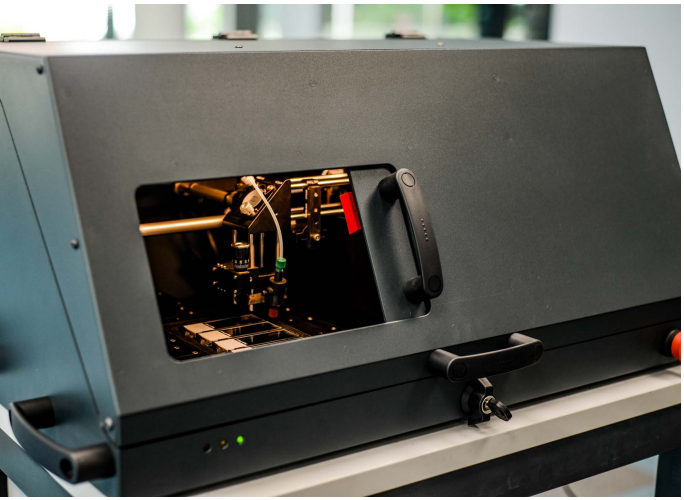
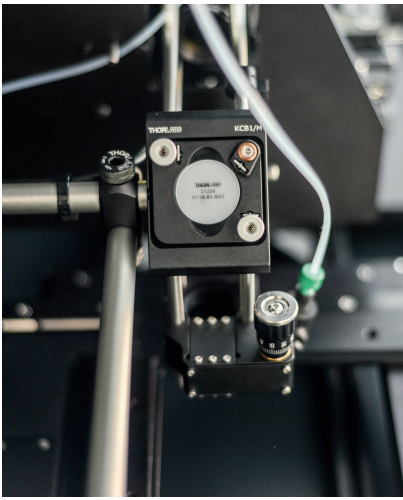
AMBIMASS
AMBIENT MASS-SPECTROMETRY SYSTEMS INTEGRATOR

AmbiSampler

High-Throughput Solution





Sample-preparation-free metabolic profiling of biological samples in seconds

Our platform, the **AmbiSampler** is capable of sampling biomaterial without the need for any sample preparation, costly reagents, or assay kits. The platform consists of a high throughput autosampler utilizing novel laser technology to aerosolize and analyse the samples.

The Mass Spectrometric analysis is performed by Ambient Laser Desorption Ionisation Mass Spectrometry, a novel ionization method capable of rapid profiling of biological materials. The platform can acquire thousands of molecular features in a single second using Mass Spectrometry.

BENEFITS

SAMPLE PREPARATION FREE WORKFLOW

Analysing samples with the **AmbiSampler** does not require any extensive extraction or sample preparation

RAPID METABOLOMICS

Untargeted metabolic, lipidomic and other profiling in seconds

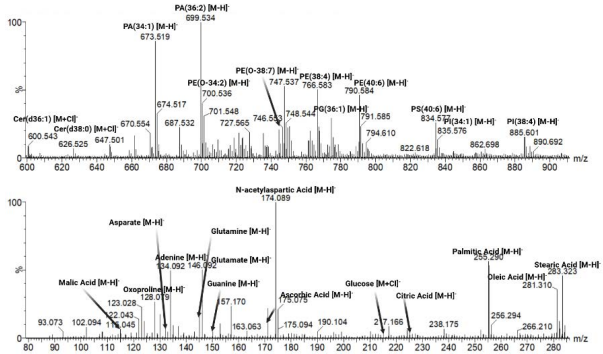
HIGH THROUGHPUT

Single datapoint in seconds, a 96 wellplate processed in 6.4 minutes

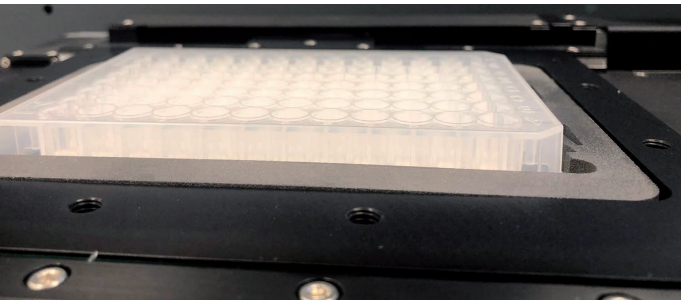
Problems Addressed

The molecular profiling of complex biological material (such as tissues, organoids or cultured cells) has been a complex challenge for decades. The **AmbiSampler** addresses this by providing a novel solution for providing rich molecular information directly from samples. The technology and method are optimized for rapid and cost-effective untargeted molecular characterization of large cohorts of biological samples. The number of observed features is comparable to that of state-of-the-art LC-MS methods.

We also offer support in method development, offering to support your choice of application with novel sample processing methods or optimised workflows.



Cell spectra were acquired directly from A2780 cells. The AmbiSampler provides robust and repeatable data even from individual cells.



Technology Overview

The **AmbiSampler** platform consists of 3 main components: the Autosampler platform equipped with a novel ambient ionisation technology in class I laser safe enclosure; the Mass Spectrometer equipped with novel Rapid Evaporative Ionisation Mass Spectrometry technology and an easy-to-use single solution control software for acquisition control.

The ambient sampling is enabled by a nanosecond pulse width - 3 µm IR laser that enables the soft ablation of metabolites, lipids, amino acids and much more directly from condensed phase samples.

Advancements from previous generation platforms:

- *Small footprint, can be fitted into a standard-sized Medical Safety Cabinet*
- *Upgraded staging – faster analysis*
- *Simplified workflow – more robust and faster operation mode*
- *Integrated Fluidics*
- *Advanced software control*

Data processing pipelines/Software

Unlock the potential of ambient metabolic data with our advanced data analysis pipeline for ambient mass spectrometry datasets. Our pipeline offers:

Quality and Precision: Our sophisticated peak detection and alignment algorithms eliminate data drift in large datasets, leveraging information-theoretic metrics to ensure superior data quality without any loss.

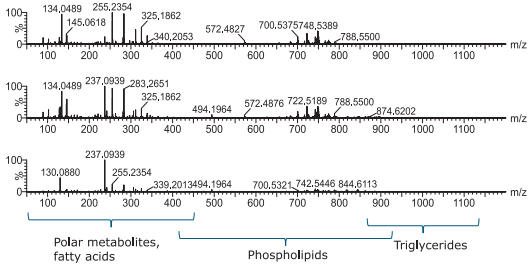
Identification and Discovery: Harness the power of our robust machine learning models, extensively trained for accurate prediction of known samples. Our models also excel at identifying trends and patterns in new data, paving the way for novel discoveries.

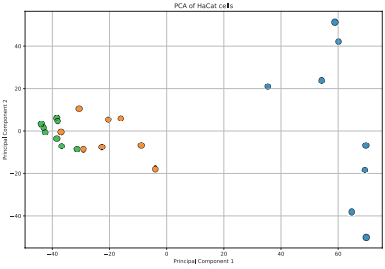
Intelligence and Interpretability: Experience the future of data analysis with our cutting-edge deep learning capabilities. Our weakly-supervised models, which require minimal annotations, enable automation, assisted decision-making, and multi-modal data integration, all while providing interpretable visualisations.

All current software is distributed under the GPL-3.0 license.

High throughput workflow – metabolic profiling

The **AmbiSampler** platform enables the rapid characterisation of industry-standard well plate formatted samples. The qualitative and quantitative analysis can be performed on various sample types and formats including grown cells in monolayer and pellet formats, liquid cell and bacterial cultures and solutions that are challenging to analyse with traditional LC-MS analytics.





Metabolic phenotyping of HaCaT cells (cellular monolayer grown on a flat-bottom 96-well plate) grown under different growth media conditions. The metabolic profile changes present in the spectra clearly distinguishes the cell lines based on the growth conditions. A PCA model was generated from ≈4500 extracted molecular features show clear separation between the different growth conditions.

Technical Data

Modes of operation	Well Plate autosampler . High-resolution imaging
Sample type	96 – Well Plate Format . 384 – well plate format Microscope-slide mounted sections/samples
Duty cycle (96 well plate)	10 minutes/well plate 2 minutes/well plate (experimental imager mode)
Molecular Coverage	Polar metabolites, fatty acids, phospholipids, amino acids, nucleobases, simple carbohydrates, triglycerides, gangliosides
Compatible Mass Spectrometers	Waters Xevo G2-XS . Waters Xevo G3 Waters TQ-XS . Waters TQ-Absolute . Waters Xevo MRT
Laser	Glucoloop Ivy mid-IR laser . 2810 nm 2 nsec pulse width, 20 uJ/pulse energy . 1500 kHz operation mode
High brightness laser*	Custom-built laser source, 2940 nm ≈100 psec pulse widht, 500kHz operation mode Subcellular (>5 µm) ablation spot sizes
Laser Safety class	Class I laser-safe
Nominal Dimensions	520mm x 832mm x 467mm (l x w x h) fits a standard-sized biosafety cabinet
Fluidics	Cadent 3 Syringe pump . Integrated 3 operation-mode

**Custom setup required for high-resolution imaging*

AmbiMass Kft. Záhony utca 7 . H-1031 Budapest . Hungary . www.ambimass.hu