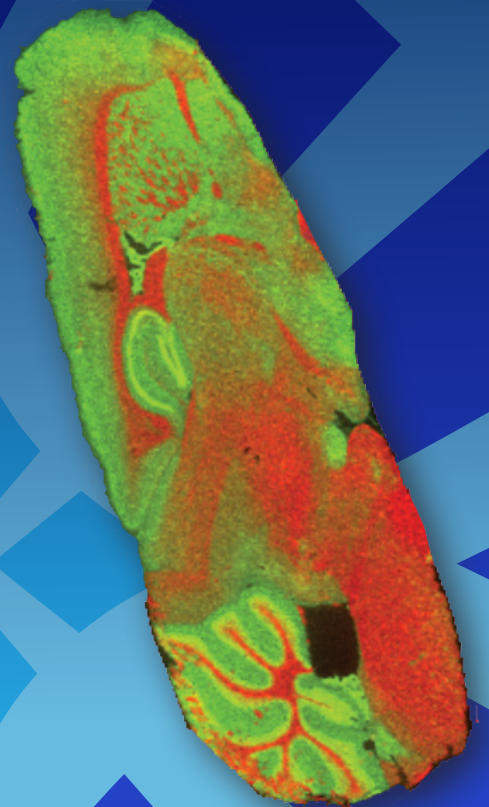
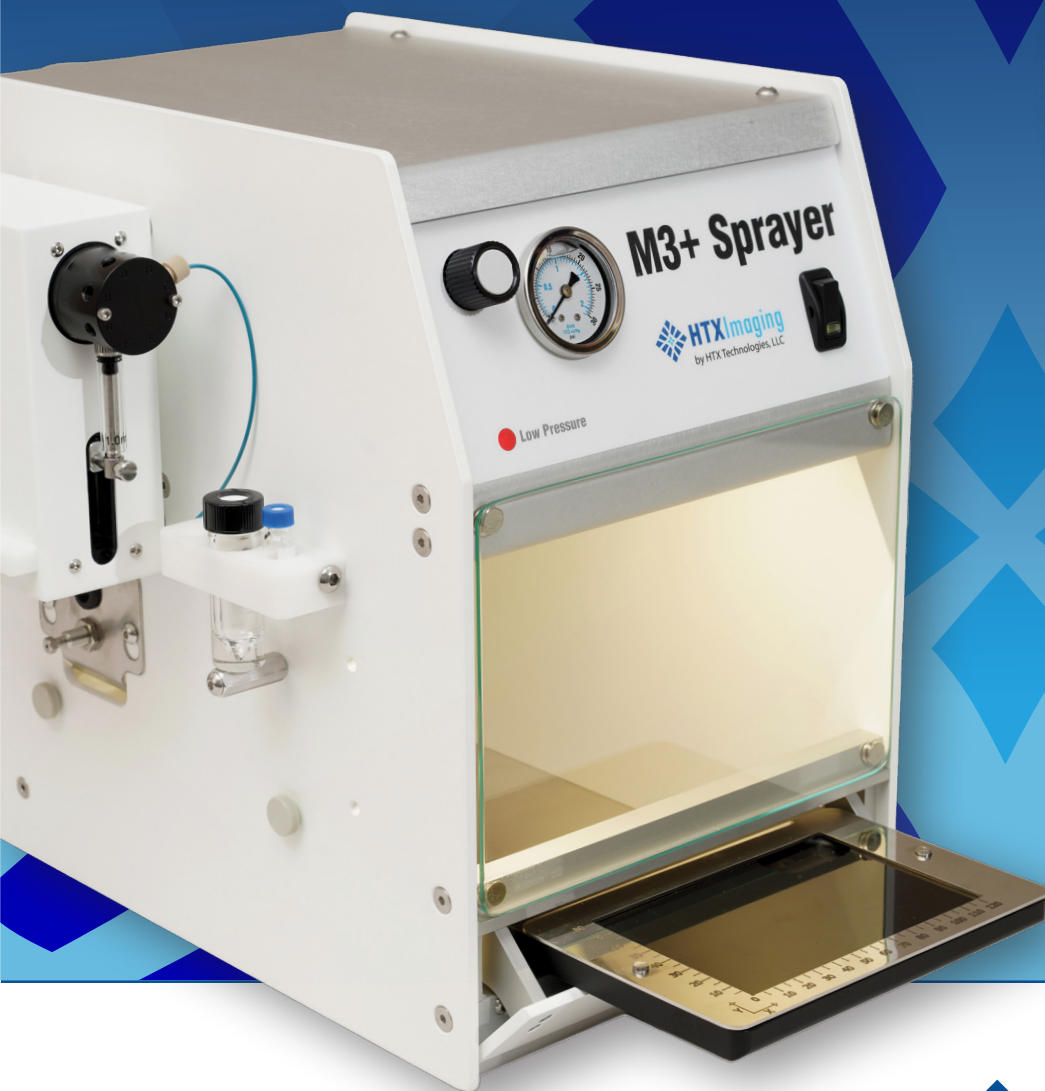


HTX M3+ Sprayer™

MALDI Imaging Sample Preparation System



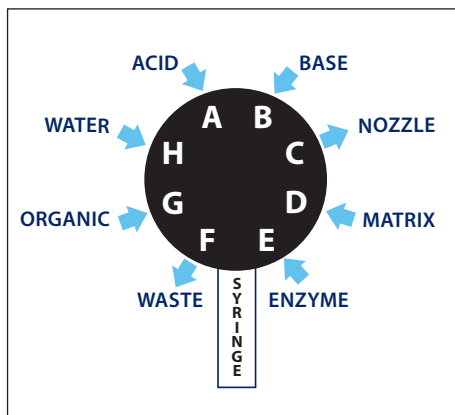
HTX M3+ Sprayer™ MALDI Imaging Sample Preparation System

The HTX M3+ Sprayer is a fully automated MALDI matrix deposition system offering robustness, ease of use, and time-saving automation that will meet the needs of Imaging Mass Spectrometry Labs.



Innovative Fluidics Control

The HTX M3+ Sprayer with Cadence Pump and PumpScripts™ (patent pending) is our most compact and automated sprayer. Designed with multi-user labs in mind, the HTX M3+ Sprayer lets users access their preferred methods quickly and fully control the spraying cycles and cleaning cycles with only a few clicks. The integration of the new Cadence Pump with 8-way valve and smart PumpScripts™ means that priming, flushing and washing steps are fully integrated in any rotocol, ensuring that the instrument maintains optimum performance over time, and is left contaminant-free for the next user.



The proprietary heated spray technology of the HTX M3+ Sprayer ensures a very fine, uniform and reproducible matrix coating crucial for high spatial resolution imaging and relative quantification of analytes. Standard

methods are well suited for 10µm spatial resolution and advanced methods are available for higher spatial resolution including single cell imaging.

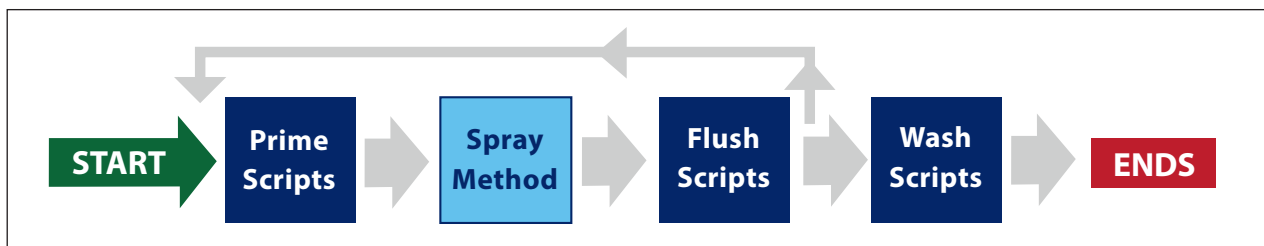
The unique ability to control liquid and propulsion gas temperature creates a fine solution mist that is wet enough to maximize analyte extraction, yet warm enough to evaporate quickly before delocalization takes place. This ensures both high signal and the best spatial resolution.

" (With the HTX M3+ Sprayer) I have been able to optimise my spray and my MS imaging is so much better than it ever has been, with both resolution and signal greatly improved!"

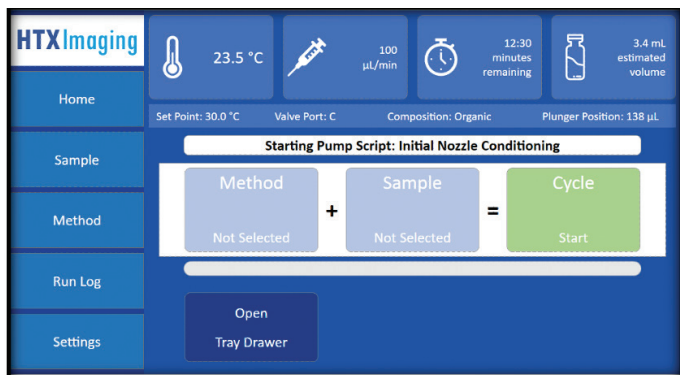
– Katie Kennedy, Sheffield Hallam University, UK

Key Characteristics

- ◆ Patented technology providing very small matrix droplets (<1 microns)
- ◆ High flow rate and fast sample prep (2 to 18 minutes per slide)
- ◆ Highly consistent matrix deposition across entire sample area (+/- 3% by weight)
- ◆ Unique use of temperature and nitrogen flow to control evaporation rate and matrix crystal formation
- ◆ Fully validated protocols for most MALDI matrices (e.g.: SA, CHCA, DHB, DAN, 9-AA, DHA, CMBT, THAP, Norharmane)
- ◆ Fully validated protocols for derivatization agents, internal standards, enzymes (e.g.: Trypsin, PNGaseF)
- ◆ Fully automated start-up, purging and cleaning cycles at the click of a button
- ◆ Optimized user interface for easy training, process control and QC log reporting.



M3+ SPRAY
METHOD WITH
PUMPSCRIPTS™



Intuitive User Interface

The fully redesigned User Interface greatly simplifies training, everyday use, and switching between protocols, users, and projects.

At the top of the screen, all essential process information such as method temperature, pump flow rate, time remaining and reagent usage are clearly visible at all times. At the center of the screen, a large status bar and touch screen friendly buttons help start and monitor enzyme or matrix spray cycles. Finally, more advanced functions such as the editing of Methods are easily accessible, but minimized during normal operation to offer a very clear and decluttered interface.

Ideal for Multi-user Facilities

The new User Interface facilitates training of new users who can safely operate the instrument within minutes. Flushing and Washing Protocols are fully automated and attached to each method which ensures that the instrument is always left perfectly cleaned and ready for the next user at the end of a cycle. Existing HTX TM-Sprayer methods are fully compatible with the new HTX M3+ Sprayer and are found under the HTX Method Folder or lab custom folders.

The ability to attach and lock Prime Scripts, Flush Scripts and Wash Scripts to a Spray Method adds reproducibility to the workflow, increases spray nozzle life, and provides peace of mind when multiple users access the same instrument.

"The M3+ Sprayer increases the robustness of our imaging endeavors in a multi-user environment such as M4I. The automated protocols increase our uptime and the optimized fluid handling reduces our consumable cost and increases the sustainability of the imaging MS workflow"

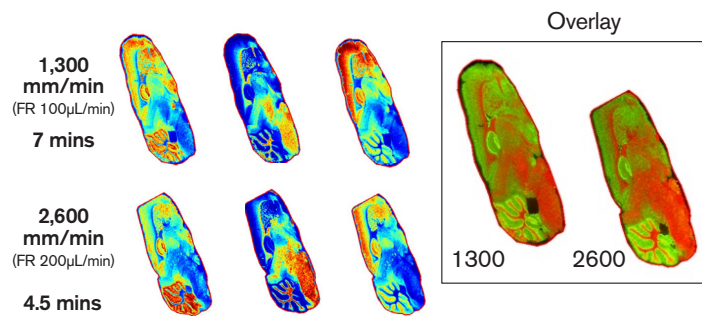
– Prof. Ron Heeren, Maastricht University, NL

Time Saving

Responding to the need for faster sample prep workflows, the HTX M3+ Sprayer offers XY stage velocity of up to 3,000 mm/min, more than double the maximum speed of the HTX TM-Sprayer. This allows at least 30% faster spray cycles with no visible reduction in signal intensity and image quality.

Effect of Increased Spray Velocities

Two serial mouse brain sections sprayed with DAN at different velocities



"Our group relies on use of multiple glycosidases and proteases in our imaging mass spectrometry analysis of clinical tissues and biofluids.

The HTX M3+ Sprayer has greatly streamlined this approach by allowing customized method programs for each enzyme combined with automatic cleaning steps between applications"

– Prof. Richard Drake, Medical University of SC, USA

Ideal for Multi-method Workflows

Many imaging workflows require multiple spray methods and thorough cleaning between consecutive spray cycles of enzyme, internal standards, or derivitization reagents prior to matrix application. These multi-method workflows can be performed on formalin-fixed paraffin-embedded (FFPE) tissues, frozen tissues, or bloodmarks. In the case of enzymatic digestions, an enzyme spray at a low flow rate takes place before incubation, and is then followed by a matrix spray at a high flow rate. Where on previous models this would require modifying the instrument configuration and following strict wash sequences, the HTX M3+ Sprayer does not require manual modifications due to its automated valve. The instrument also fully handles any complex cleaning through the embedded PumpScripts™. This makes the HTX M3+ Sprayer ideally suited for research labs developing clinical assays or high throughput quantitative analysis.

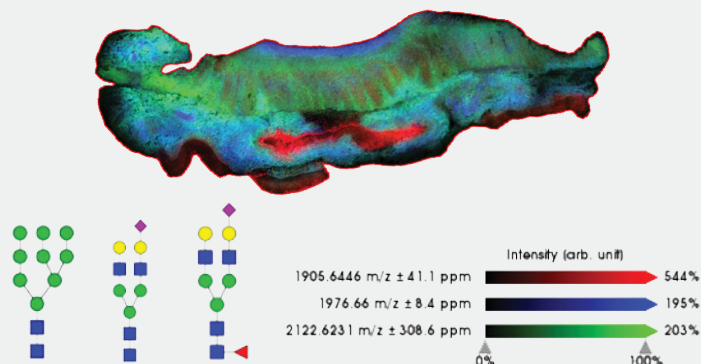
HTX M3+ Sprayer™ MALDI Imaging Sample Preparation System

Application Examples

N-GLYCAN IMAGING

REAGENT	PNGaseF (enzyme)	CHCA (matrix)
CONCENTRATION	0.1 µg/µL	7 mg/mL
FLOW RATE	25 µL/min	100 µL/min
PASSES	15	10
TEMP	45 °C	79 °C

Images of N-glycans by MALDI-MS can be used to detect disease-associated signatures that can be used as clinical biomarkers to impact patient care. A colon tumor tissue section is shown below.

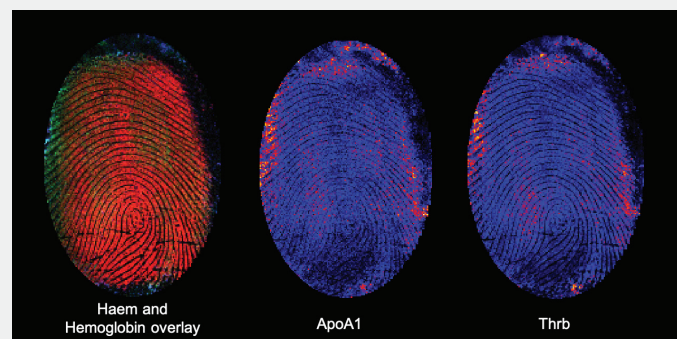


N-glycan imaging reagents and tissue courtesy of Richard Drake, Medical University of South Carolina, USA

PEPTIDE IMAGING

REAGENT	Trypsin (enzyme)	CHCA (matrix)
CONCENTRATION	150 µg/mL	5 mg/mL
FLOW RATE	30 µL/min	100 µL/min
PASSES	8	4
TEMP	30 °C	75 °C

Images of fingerprints by MALDI MS Imaging can provide identification of blood and suspects, of compounds such as illegal drugs, cosmetics and bio-fluids.

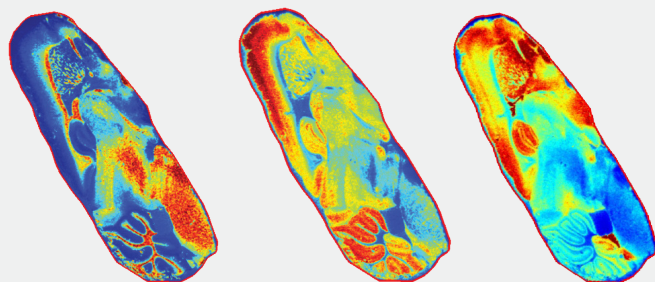


Fingerprints courtesy of Katie Kennedy & Simona Francese, Sheffield Hallam University, UK

LIPID IMAGING

REAGENT	DAN
CONCENTRATION	5 mg/mL
FLOW RATE	100 µL/min
PASSES	10
TEMP	77 °C

Images of lipids by MALDI-MS can be important markers of cell signaling and neurobiology.



Lipid imaging reagents and tissue courtesy of Peggi Angel, Medical University of South Carolina, USA

HTX M3+ Sprayer

Technical Characteristics

Dimensions

12"W x 14"H x 13.5"D
(30.5 x 35.5 x 34.3 cm)

Weight

30lbs (13.5kg)
Available spray area 81 x 125mm
Motorized drawer loading.

Spray Range

0.010 mL/min to 0.500 mL/min
Max Velocity 3,000 mm/min

Heated Nozzle

24V 40W 30°C to 130°C.
Pressure 2 Bars (30 psi)



HTX TECHNOLOGIES PRODUCTS ARE FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTICS PROCEDURES.

HTX M3+ Sprayer™ is available worldwide from HTX Technologies, LLC and authorized distributors. To request further information contact:

Andrew Reeder

Technical Sales Representative, Verulam Scientific Ltd.

Andrew.Reeder@verulamscientific.com

HTX Technologies offers innovative sample preparation systems for advanced analytical platforms. Our integrated workflow solutions include user training, instruments, software, consumables and method development services.



SUPPLY & SERVICE OF ANALYTICAL INSTRUMENTS

4 Appley Court | Appley Wood Corner
Haynes | Bedfordshire | MK45 3QQ | United Kingdom

01234 381000 ♦ enquiries@verulamscientific.com

www.verulamscientific.com