

# HTX Sublimator™

High Speed Chemical Nano-Coating System



**HTXImaging**

by HTX Technologies, LLC

# HTX Sublimator™

The HTX Sublimator™ is an automated MALDI matrix deposition system offering speed, reproducibility, and the smallest available crystals for sub-micron resolution mass spectrometry imaging.

The HTX Sublimator™ is a robust and easy-to-use sublimation system offering a standardized and controlled method for sample preparation for matrix assisted laser desorption/ionization (MALDI) mass spectrometry.

The vacuum chamber is designed for maximum speed and reduced MALDI matrix consumption. Electronic controls and pre-defined matrix deposition protocols ensure sample-to-sample **reproducibility** and **optimum matrix surface quality**.

The unique system can achieve sublimation conditions in less than 2 minutes, for a total sample preparation cycle of less than 5 **minutes**, making the HTX Sublimator™ especially well-suited for high-throughput applications.

With a smaller footprint than a conventional glassware sublimation apparatus, the HTX Sublimator™ features a shatterproof chamber is easy to open, load, and clean and offers a distinctive bulkhead-style viewing window.

The single position sample holder is designed for standard 25 x 75 mm microscope slides of variable thickness.



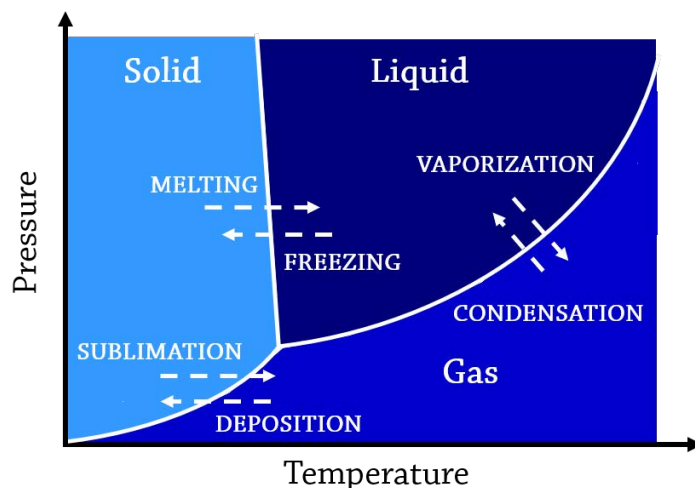
Figure 1. The HTX Sublimator™

## Key Characteristics

- ◆ Sublimation conditions reached in less than 2 minutes when used with a 20 milliTorr rated vacuum pump (e.g. Edwards E2M28)
- ◆ Timer-controlled sublimation step
- ◆ Completion of sublimation step in less than 180 seconds for most matrices
- ◆ Validated protocols for DHB, CHCA, SA, DAN, AA, Norhamane

## Benefits of Sublimation

1. Resolution: Sublimation provides minimum crystal size in the nanometer range
2. Minimum Delocalization: By skipping the liquid phase in the matrix deposition process, more spatial information is preserved in samples
3. Efficient: The matrix layer can be applied in one single process



**Figure 2.** Phase state diagram. Sublimation is an endothermic process by which solid matrix undergoes a direct phase transition to a gas and then deposits in a homogenous layer onto the sample mounted in the top of the chamber. In the vacuum chamber of the HTX Sublimator™, we use a heated plate to sublimate matrix from the bottom of the chamber and then use a cooled plate to deposit the matrix onto the sample. All of this occurs below the triple point of the matrix, so no liquid phase is ever involved to induce analyte delocalization.

### Case Study #1: Imaging of Lipids in Mini Pig Colon

Experimental Summary	
Tissue Type	Mini pig colon
Preservation	Fresh frozen
Tissue Cut	10 µm
Pre-Sublimation Sample Preparation	None
Time to Ready Vacuum	90 seconds
Time to Complete Sublimation Step	160 seconds
HTX Sublimator™ Plate Temperature	160°C
Instrumentation and Supplies	
Microtome	HM 525 (MICROM)
MALDI Plate	ITO coated glass slide
Matrix	DHB powder (Sigma-Aldrich)
Matrix Deposition and Re-crystallization Device	HTX Sublimator™
MALDI MS	Bruker rapifleX MALDI TissueTyper™
Laser Raster	10 µm
Imaging Software	flexImaging™ v4.1

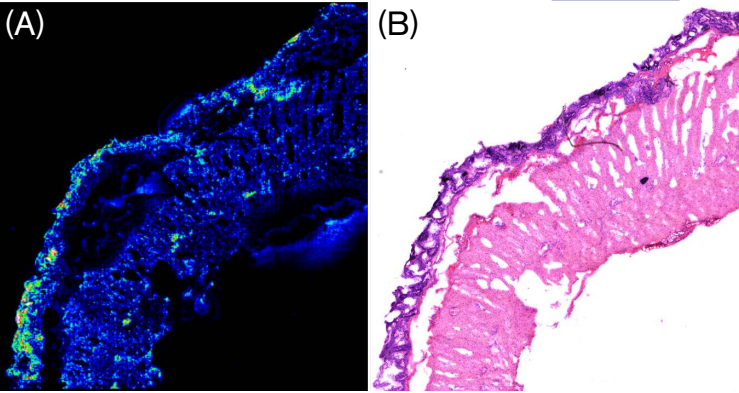


Figure 2.

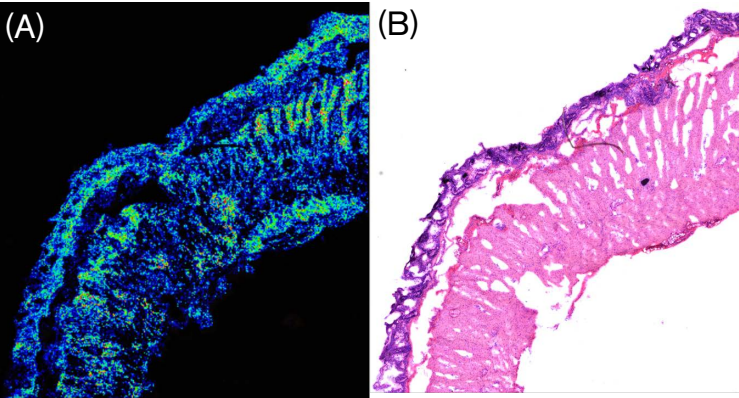


Figure 3.

### Case Study #2: Imaging of Lipids in the Brain of an Alzheimer's Model Mouse

Experimental Summary	
Tissue Type	Mouse brain
Preservation	Fresh Frozen
Tissue Cut	12 µm
Pre-Sublimation Sample Preparation	20-30 minutes desiccation
Time to Ready Vacuum	90 seconds
Time to Complete Sublimation Step	300 seconds
HTX Sublimator™ Plate Temperature	140°C
Instrumentation and Supplies	
Microtome	HM 525 (MICROM)
MALDI Plate	ITO coated glass slide
Matrix	DAN powder (Sigma-Aldrich)
Matrix Deposition Device	HTX Sublimator™
MALDI MS	Waters Synapt G2Si
Laser Raster	50 µm
Imaging Software	Waters HDI Imaging Software

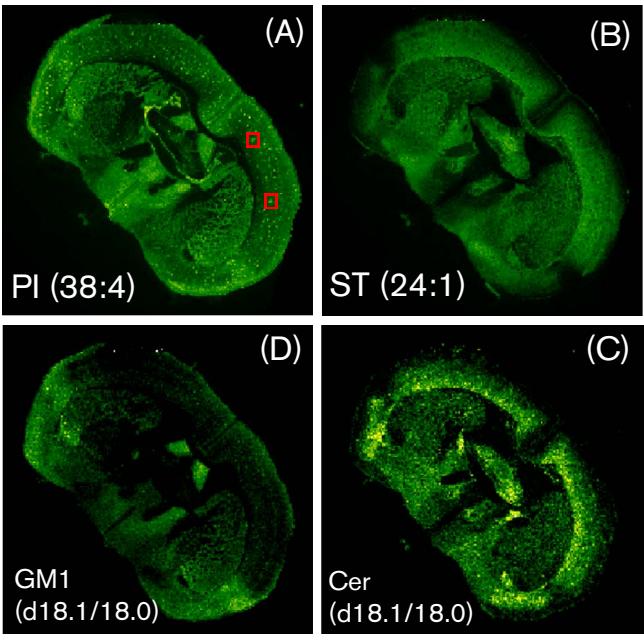


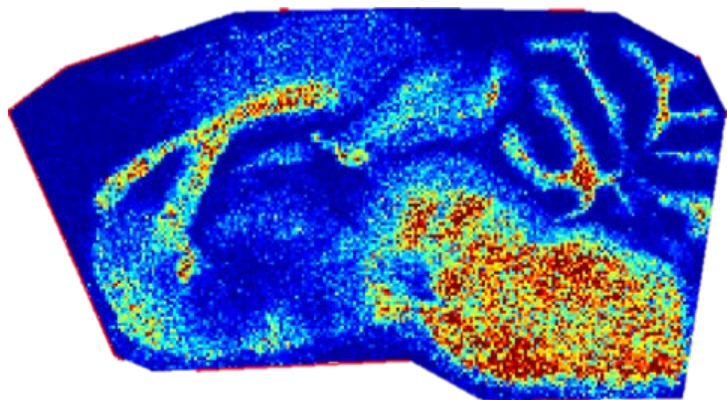
Figure 4. Ion distributions in Transgenic APP KM670/671NL/PS1L166P mice, a model for Alzheimer's disease. Note amyloid plaques outlined in red in (A).



# HTX Sublimator™

## Case Study #3: Imaging of Lipids in a Mouse Brain

Experimental Summary	
Tissue Type	Mouse brain
Preservation	Fresh frozen
Tissue Cut	12 µm
Pre-Sublimation Sample Preparation	20-30 minutes desiccation
Time to Ready Vacuum	90 seconds
Time to Complete Sublimation Step	300 seconds
HTX Sublimator™ Plate Temperature	140°C
Instrumentation and Supplies	
Microtome	HM 525 (MICROM)
MALDI Plate	ITO coated glass slide
Matrix	Norharmine powder (Sigma-Aldrich)
Matrix Deposition Device	HTX Sublimator™
MALDI MS	Thermo Scientific™ Orbitrap™ Mass Analyzer
Laser Raster	20 µm
Imaging Software	ChemomeTricks Toolbox for Matlab v7.0



**Figure 5.** Ion distribution of  $m/z$  890.6 [PI (38:2-H)]<sup>-</sup> in a mouse brain.

*Images and data are courtesy of Prof. Ron Heeren's lab at Maastricht MultiModal Molecular Imaging Institute (M4I), Maastricht, The Netherlands.*

## HTX Sublimator™ Specifications

### Sublimation Module

Dimensions	19 x 13 x 18" (47 x 32 x 45 cm)
Weight	46 lbs. (21 kg)
Vacuum Connector	DN 25 ISO-KF 40 mm
Cooling Water Connector	5/16" ID Water Hose
Nitrogen/Purge Gas Connector	6 mm ID tube
Pressure Sensor (Pfeiffer Vacuum)	110V – 220 V

### Electronic Controller

Dimensions	8 x 19 x 12" (20 x 49 x 31 cm)
Weight	22 lbs. (10 kg)
Connectors	6 XX Type Connector, IEC Type C-13 Input, USB
Voltage Input	110V – 240V
Power	100 Watts
Cord Type	C-13

### Tablet PC

Windows Notebook Tablet PC	8GB RAM Intel Core i3 or better
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### Vacuum Pump Capable of 0.04 mBarr

#### Recommended: Edwards E2M28

Dimensions	23 x 6.8 x 11" (58 x 17 x 28 cm)
Weight	97 lbs. (44 kg)
Inlet Flange	NW25

The HTX Sublimator™ is available worldwide exclusively from HTX Technologies, LLC and authorized resellers.

To request further information contact:

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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.



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