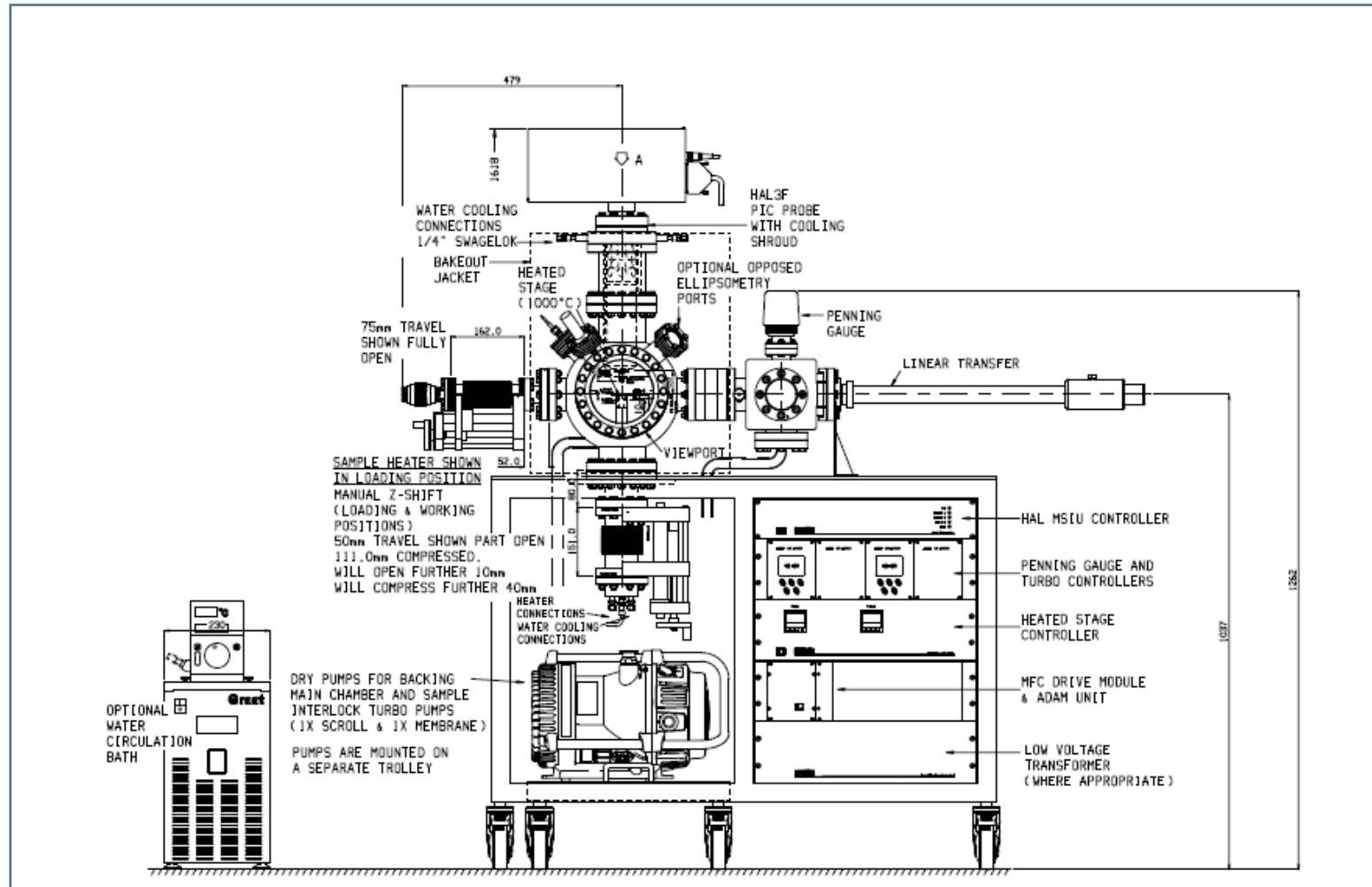


Hidden TPD Workstation

A complete experimental system for UHV
temperature programmed desorption (TPD)
studies

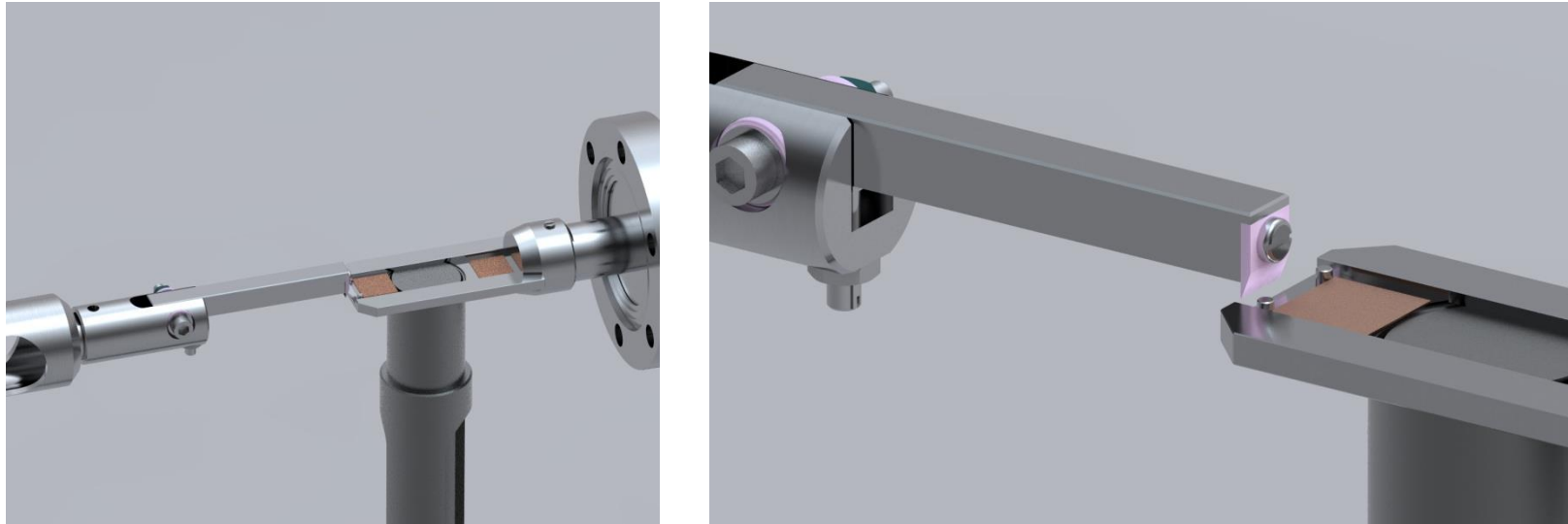
TPD Workstation



TPD Workstation

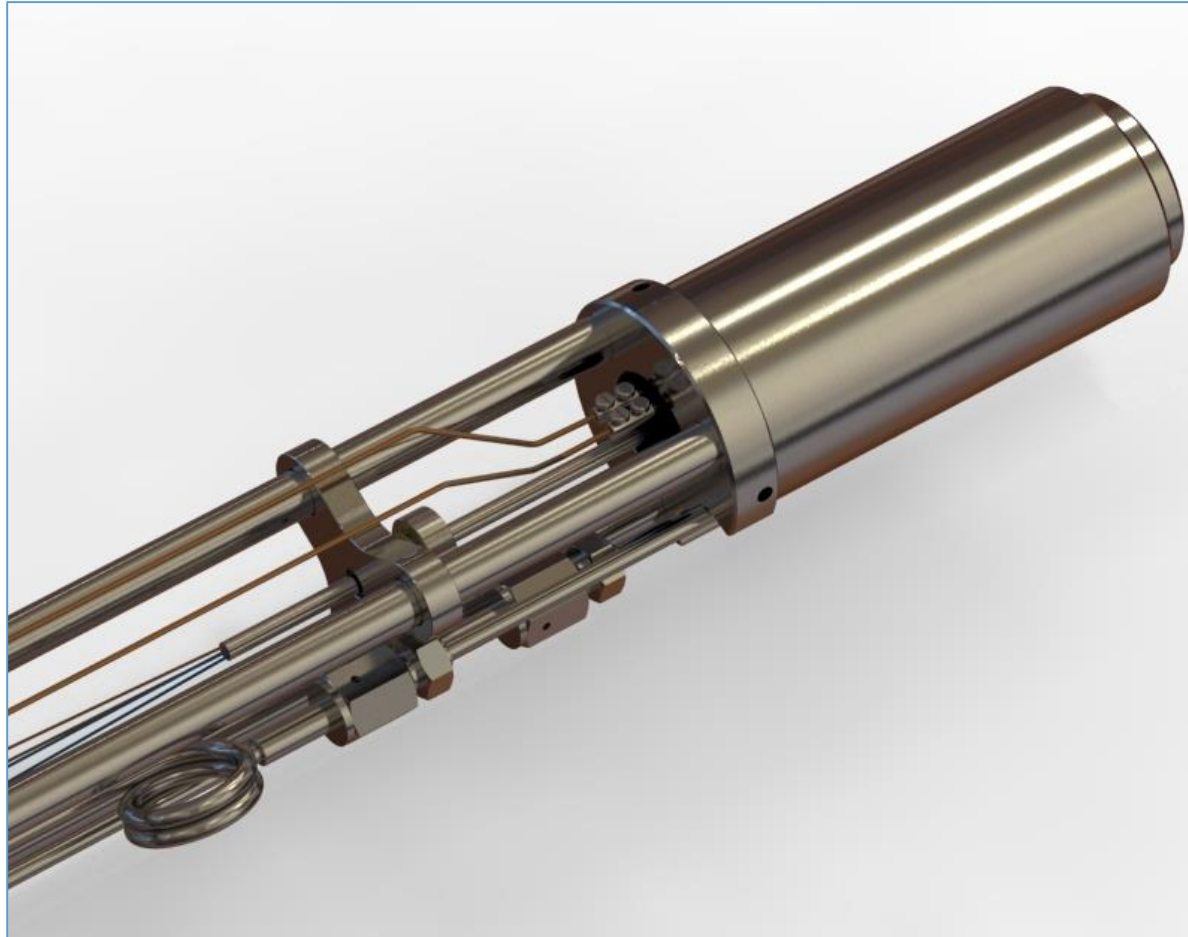


Sample Loading Mechanism

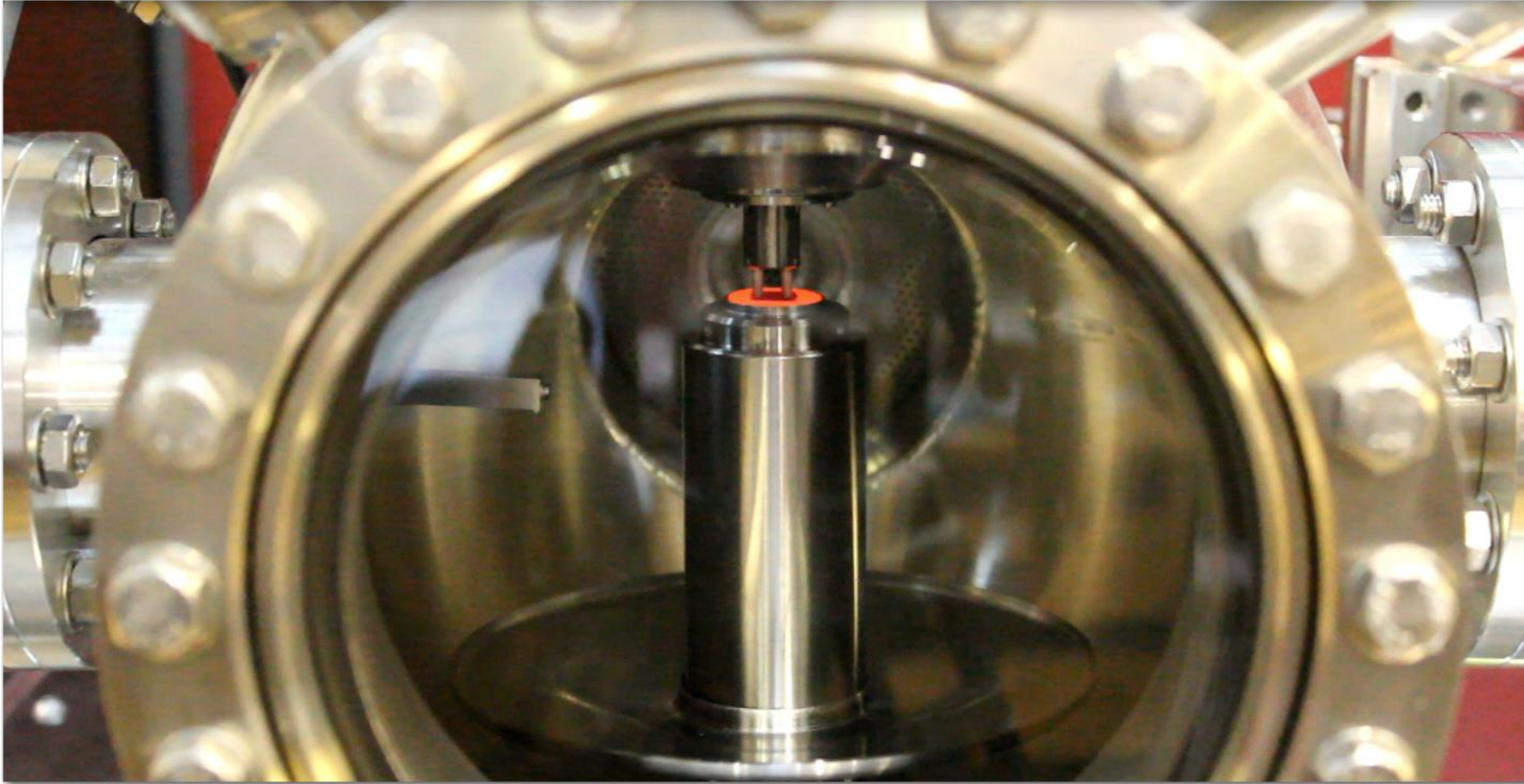


Only the sample is inserted/removed from the UHV analysis chamber to the loadlock, i.e. the heated stage remains at UHV at all times in order to minimise unwanted desorption peaks.

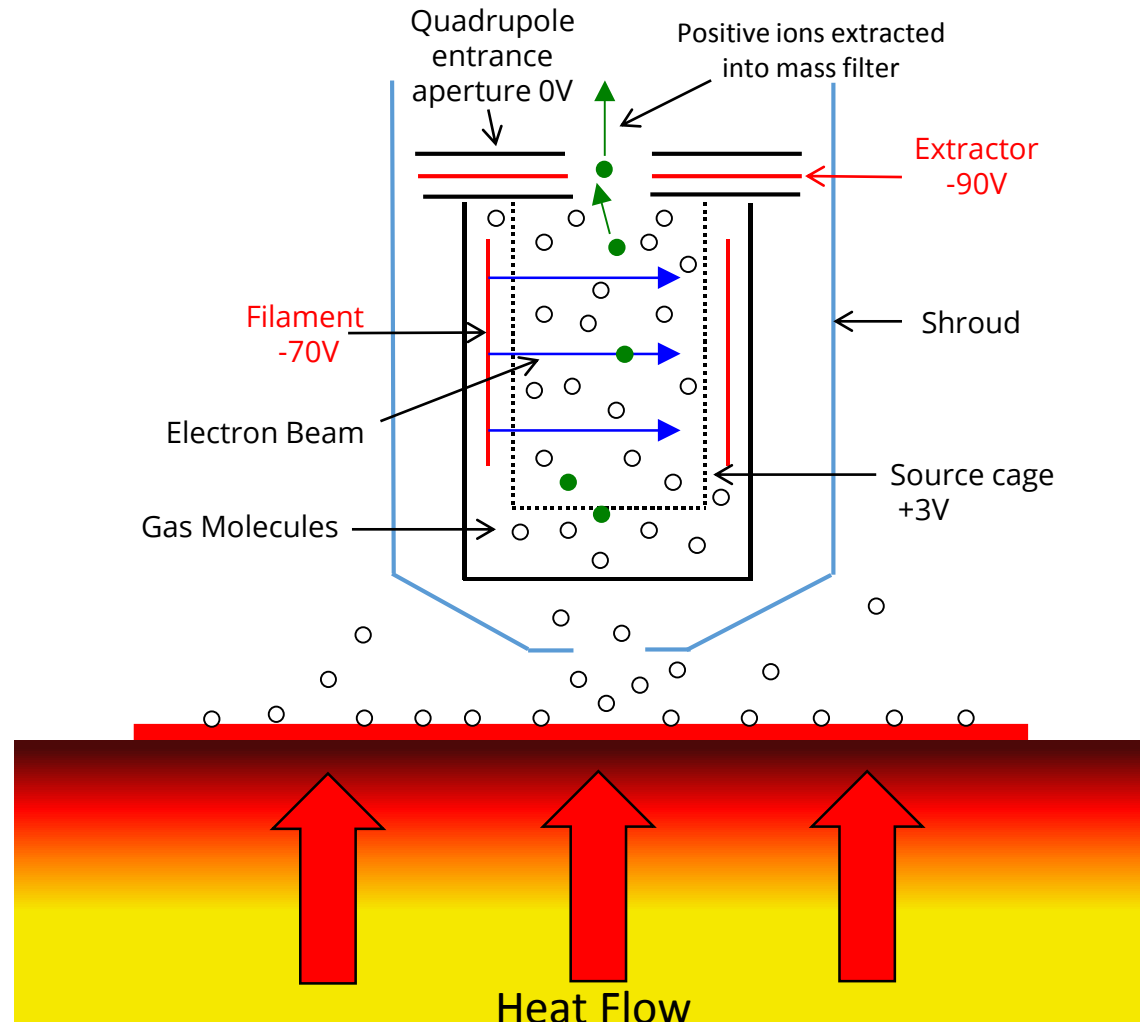
TPD Heater



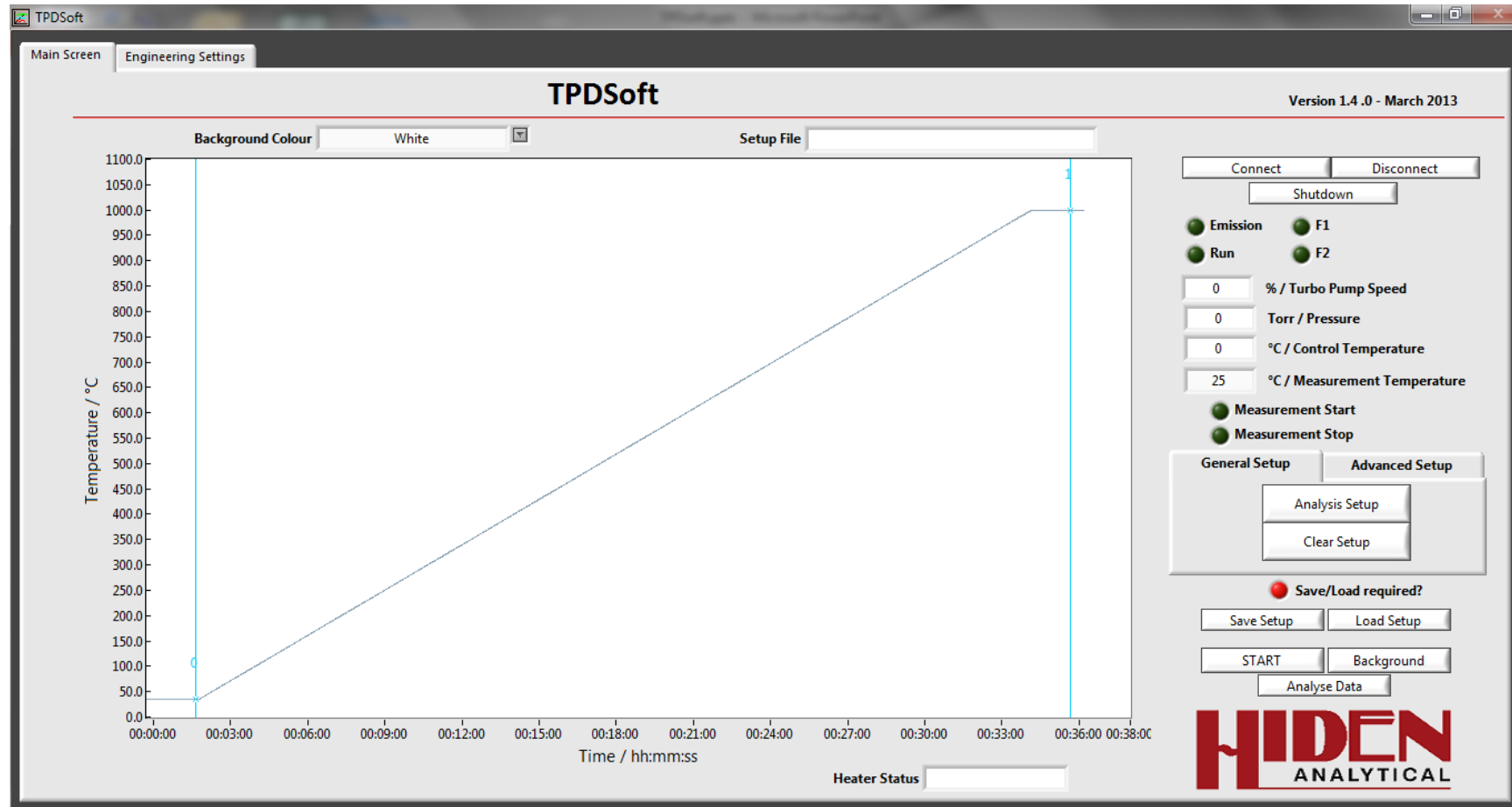
- Resistive Heating element
- Integral water cooled shroud to minimise outgassing



Thermal Desorption and Detection



TPDsoft



- Control of MS and Temperature in one software package.

Hardware Control Parameters

The screenshot displays the 'Engineering Settings' window of the TPDSOFT software. The window is divided into several sections for configuring the mass spectrometer's hardware.

Locked (Green button)

Engineering Settings

MSIU Settings

- Multiplier Voltage: 1800
- Filament: F1
- Settle Time Fast %: 50
- Settle Time Normal %: 100
- Settle Time Slow %: 200
- Dwell Time Fast %: 50
- Dwell Time Normal %: 100
- Dwell Time Slow %: 200
- Units: ☒ % ☐ ms

PID Settings

Range	Proportional	Integral	Derivative
0.0 < 11.0 C/min	120	55	20
11.0 < 21.0 C/min	120	52	20
21.0 < 31.0 C/min	120	55	20
31.0 < 41.0 C/min	120	55	20

Buttons: Add Row (+), Remove Row (-)

Thermal Settings

- Water Bath Default Temperature: 20 (Set button)
- IR Thermometer: Disabled
- Minimum Thermal Value: 35
- Measurement Temperature Calibration Value: 0.8

Heating Power

Temperature Range	Power
0 - 100	10
101 - 200	20
201 - 300	30
301 - 400	40
401 - 500	50
501 - 600	60
601 - 700	100
701 - 800	100
801 - 900	100
901 - 1100	100

Device Settings / **Folder Information**

Mass Spectrometer

- Connection Type: Serial
- Com Port: 5
- WR Number: 13709
- Socket: 5025
- Use Hidden.ini: ☒

Water Bath

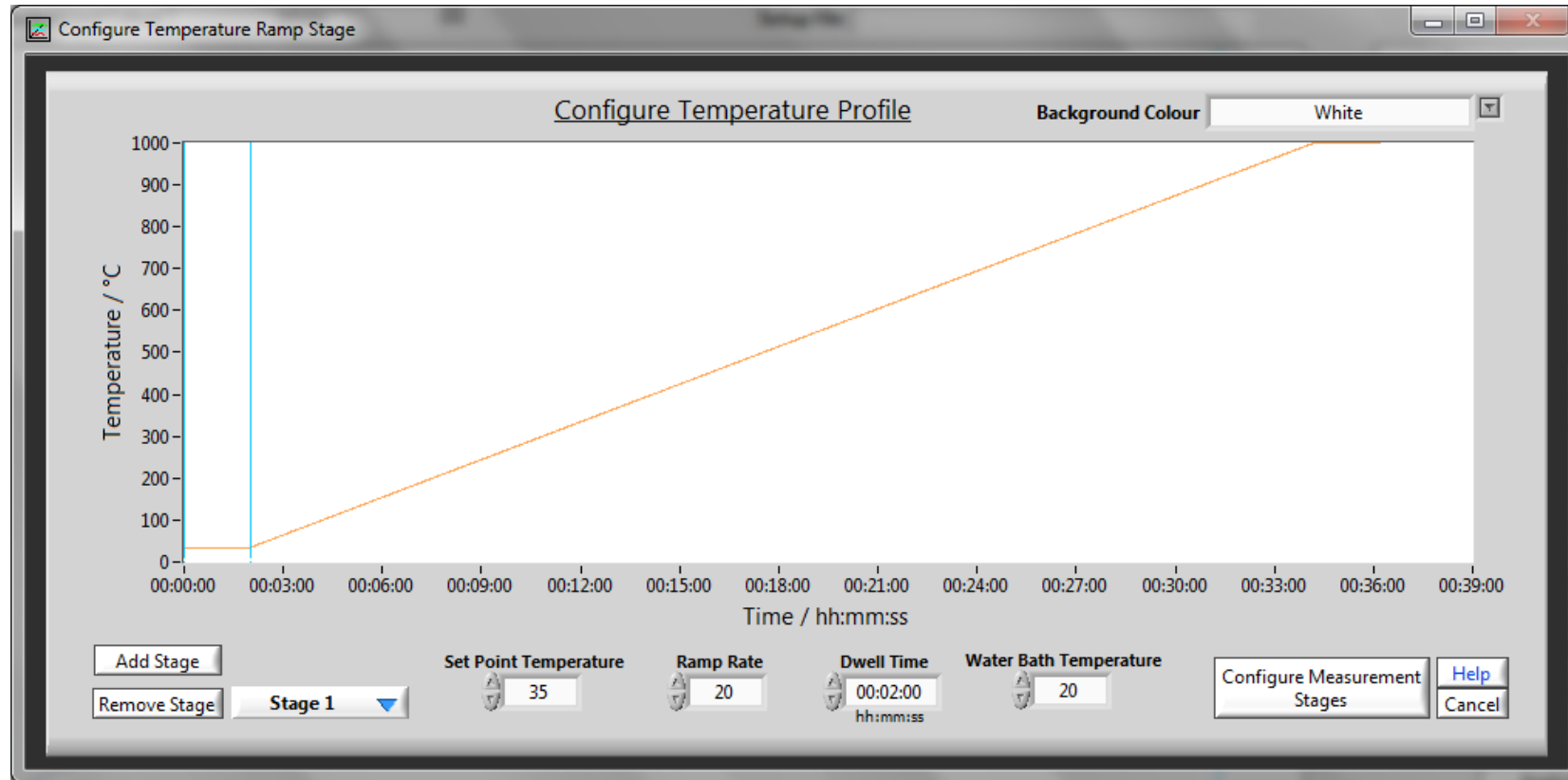
- Port: COM16
- Model: (empty)
- Test button

Detector Type

- PIC

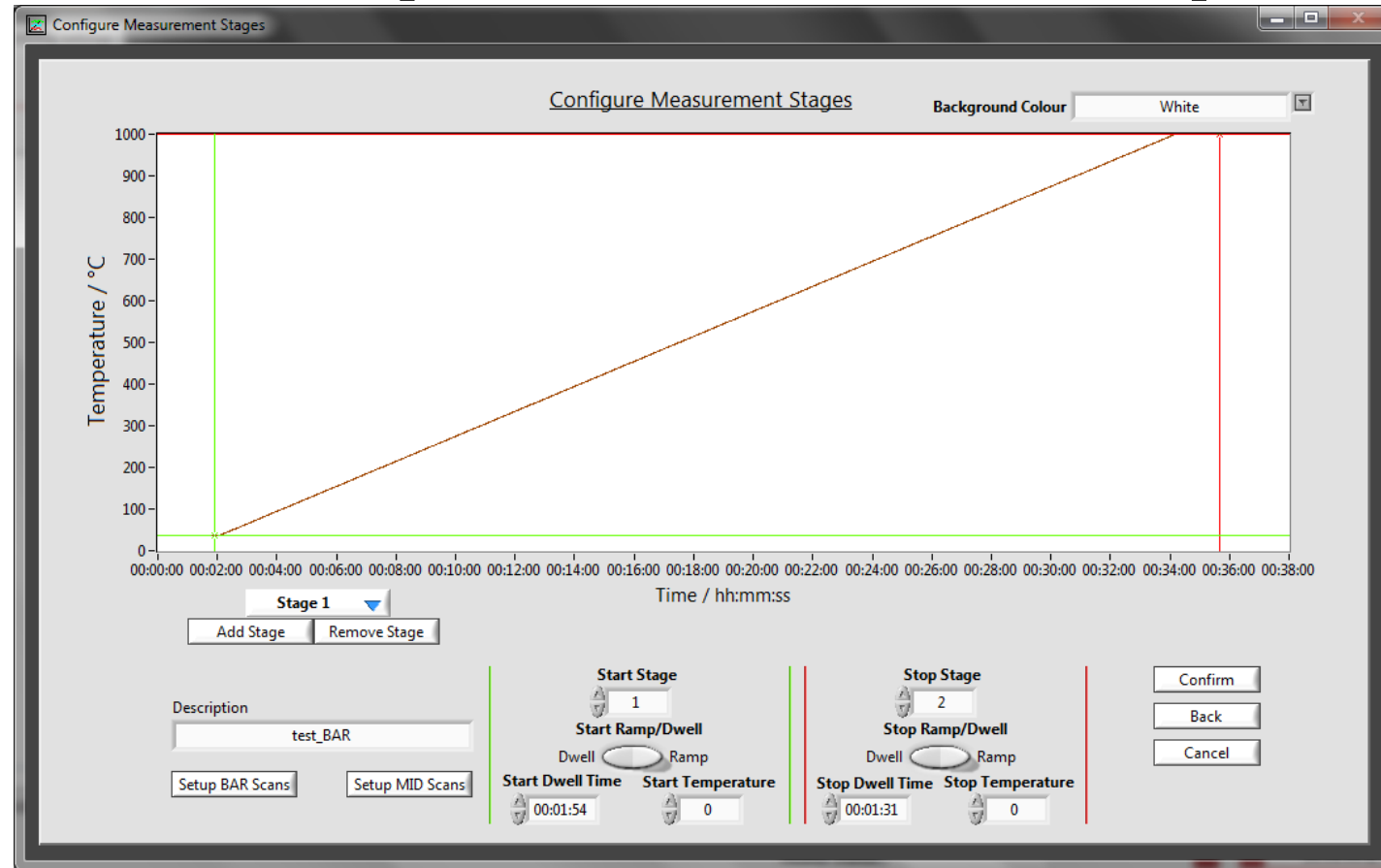
Note. Selecting the incorrect detector type will cause the system to become unstable and should NOT be done.

Experimental Setup



- Stage 1: Configure the temperature profile of the experiment
 - set ramp rate, set point and dwell time for each stage.

Experimental Setup



- Stage 2: Add measurement stages. Stages are triggered by time or temperature depending where on the temperature profile the start/stop is placed.
 - Different MS analysis types can be configured for each stage of the experiment.

MS Control - BAR Mode

The screenshot displays the 'BAR Scan Setup' window, which is used for configuring mass spectrometer scans. The window is titled 'BAR Scan Setup' and contains a section titled 'Bar Scan Settings'. This section is divided into three subscan configurations: 'Bar Subscan 1', 'Bar Subscan 2', and 'Bar Subscan 3'. Each subscan has a set of controls including an 'Enabled' checkbox, 'Start Mass', 'Stop Mass', 'Increment', 'Detector', 'Aurorance High', 'Aurorance Low', 'Start Range', 'AutoZero', 'Electron Energy', 'Emission Current', 'Settle Speeds', and 'Dwell Time'. The 'AutoZero' checkbox is highlighted in green in all three subscans. The 'Save', 'Load', and 'Exit' buttons are located at the bottom of the window.

Subscan	Enabled	Start Mass	Stop Mass	Increment	Detector	Aurorance High	Aurorance Low	Start Range	AutoZero	Electron Energy	Emission Current	Settle Speeds	Dwell Time
Bar Subscan 1	Enabled	1	30	1	SEM	-7	-11	-8	ON	70	500	Normal	Normal
Bar Subscan 2	Enabled	35	50	1	SEM	-7	-11	-8	ON	70	500	Normal	Normal
Bar Subscan 3	Enabled	100	200	1	SEM	-7	-11	-8	ON	70	500	Normal	Normal

- Multiple Bar scans can be configured in 3 subscan sections for optimised sampling of unknowns.
- Ion source control for each subscan.

MS Control – MID Mode

MID Setup

Gas	40	20	36	38	0	0	0	0	0	0
Gas 1 Argon	999	107	3	1	0	0	0	0	0	0
Gas 2 Hydrogen	999	100	0	0	0	0	0	0	0	0
Gas 3 Water	999	230	11	7	3	1	0	0	0	0
Gas 4 Oxygen	999	114	4	1	0	0	0	0	0	0
Gas 5	0	0	0	0	0	0	0	0	0	0
Gas 6	0	0	0	0	0	0	0	0	0	0
Gas 7	0	0	0	0	0	0	0	0	0	0
Gas 8	0	0	0	0	0	0	0	0	0	0

Page 2

Save Load

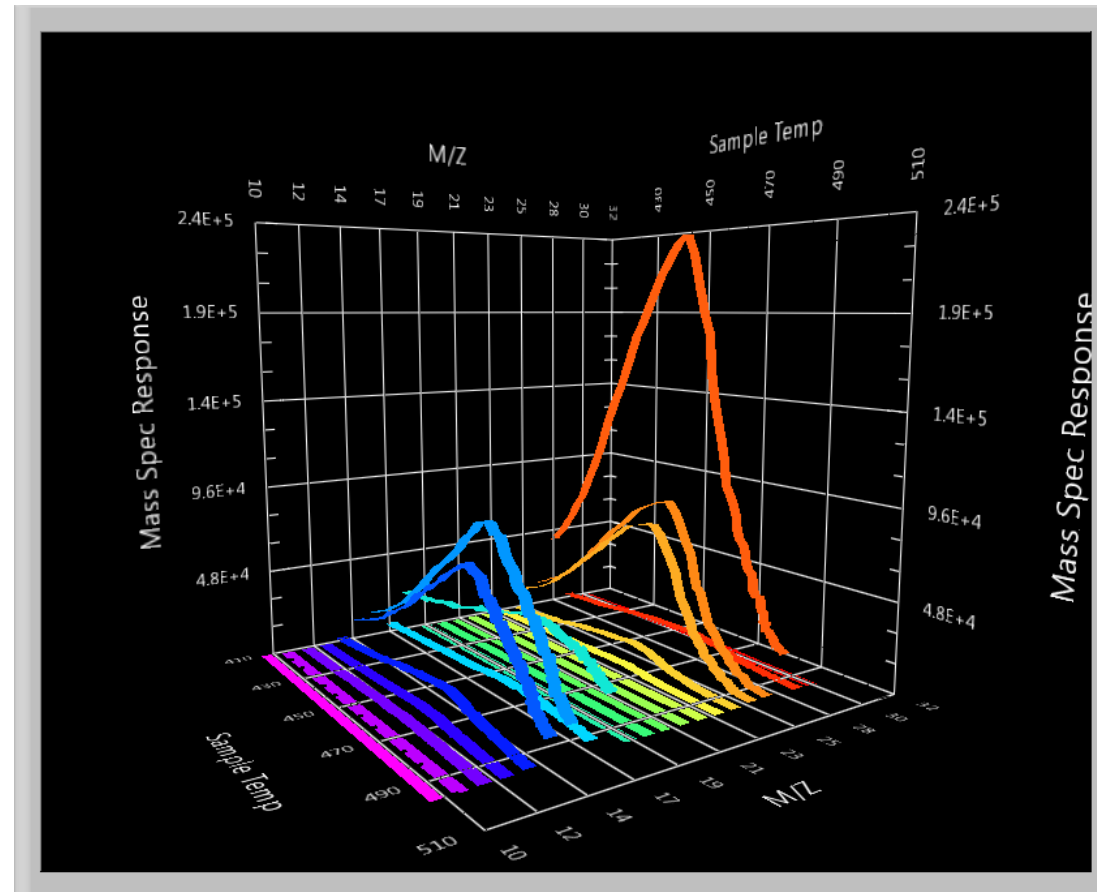
Exit

Show Advanced Settings

Show Limits

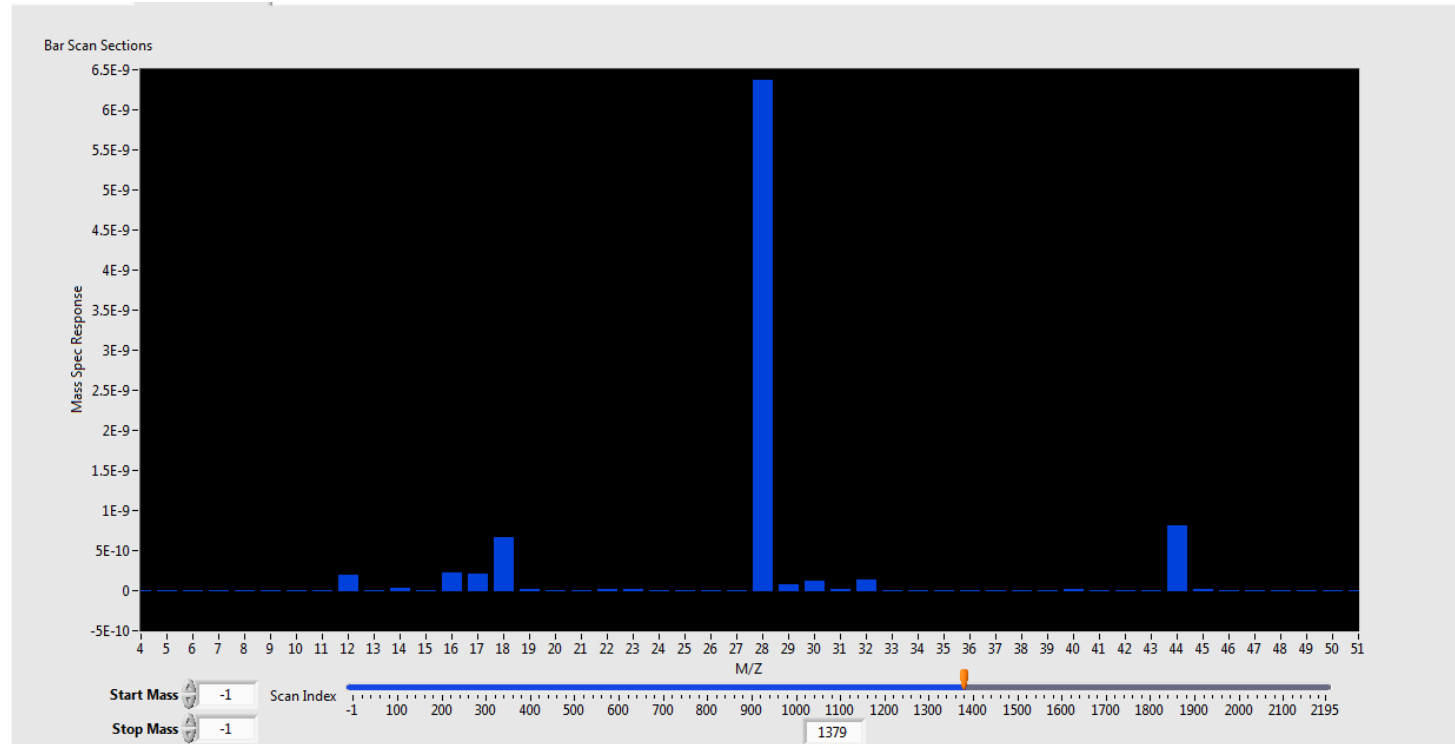
- MID Scan setup for known species.
- Automatic overlap removal.
- Includes library of most common gases.
- Ion source control for each species – preferential ionisation of some overlapping gases.

MS Display – 3D BAR



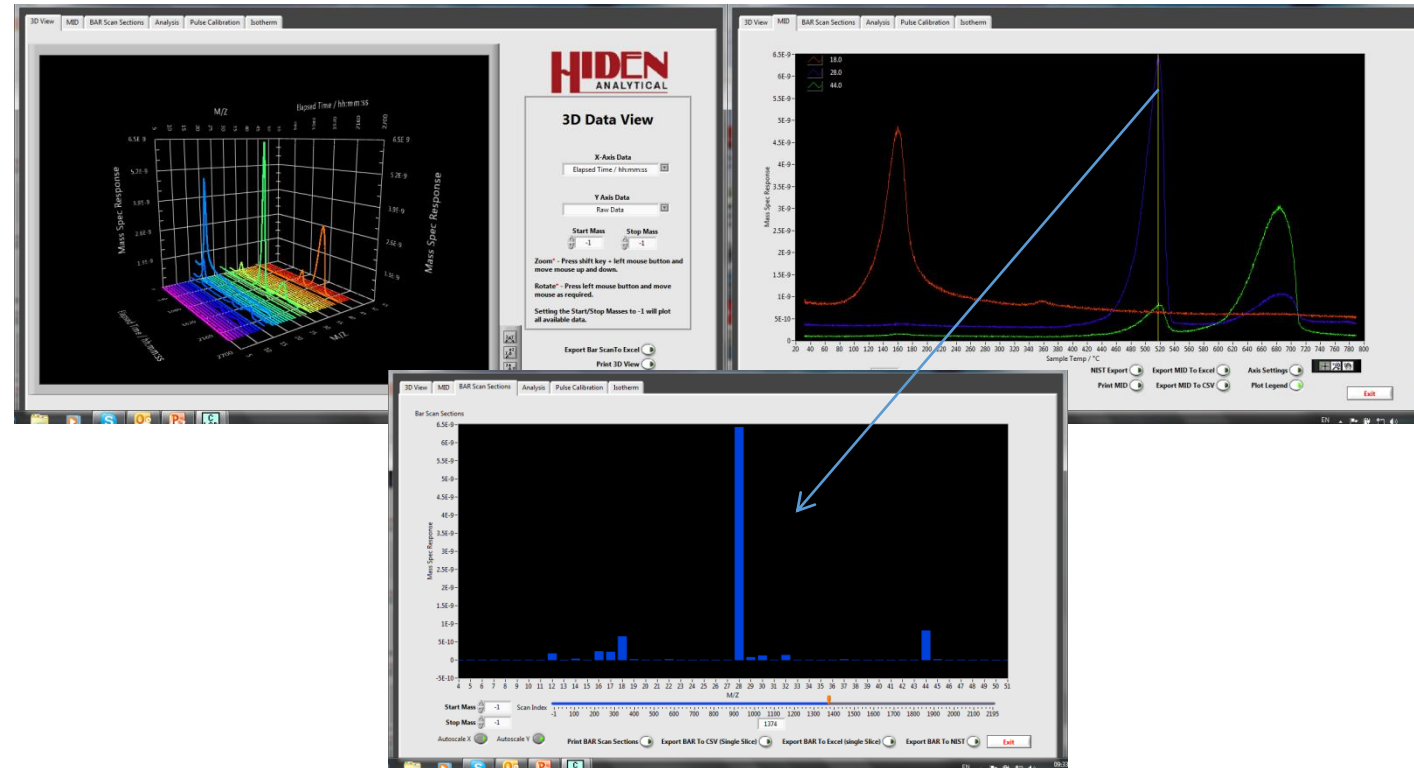
- 3D Bar Graph mode for easy identification of bar mode trends.
- Rotate or zoom in on regions of interest.

MS Display - 2D BAR



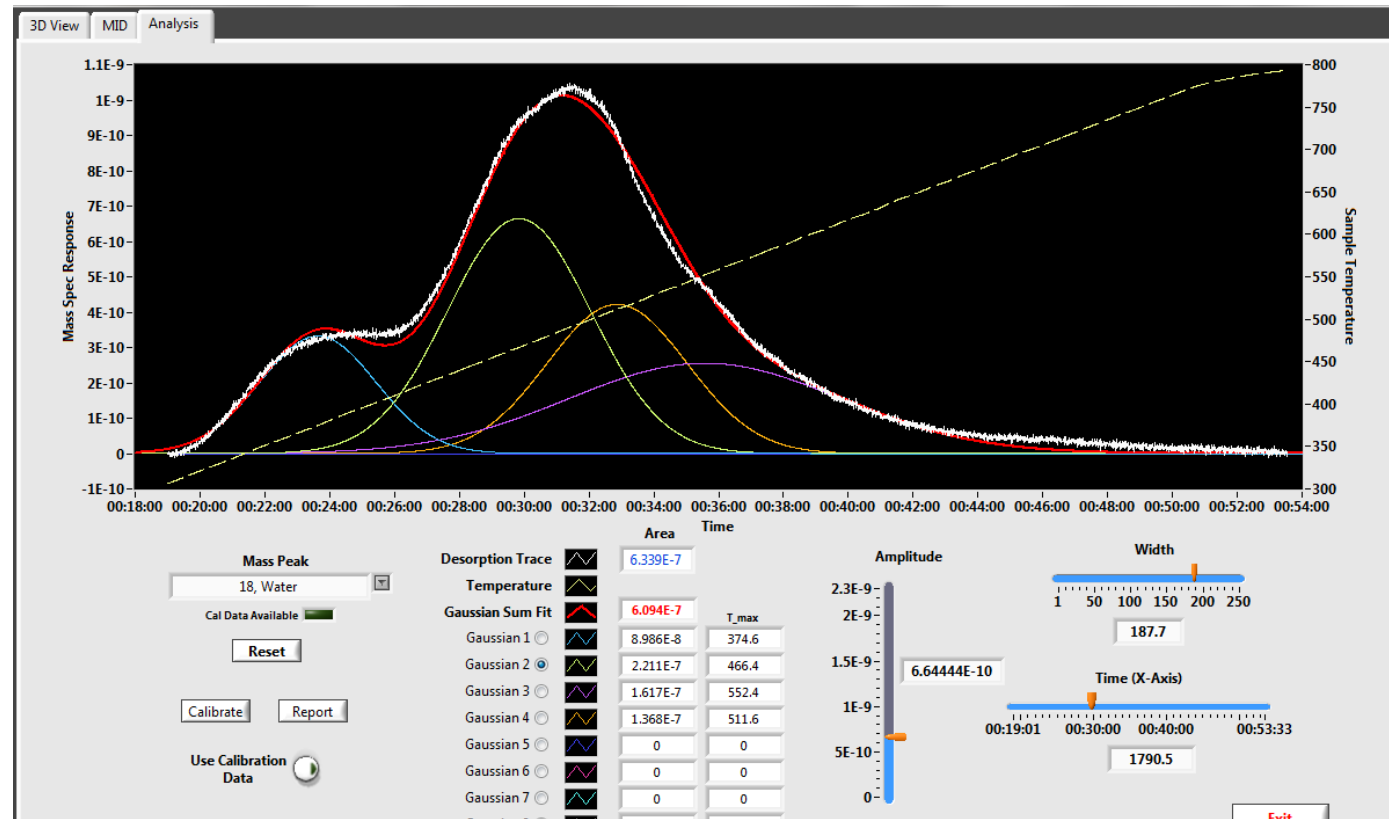
- View single cycle of BAR scan data

Data Analysis



- 3D Bar, 2D Bar and MID modes all available in data analysis mode.
- Multiple export/print options.
- Export selectable masses or whole scan to NIST database for identification of unknowns.
- 2D Bar and MID view linked to enable viewing of Bar scan at any point in the MID trace and vice versa.

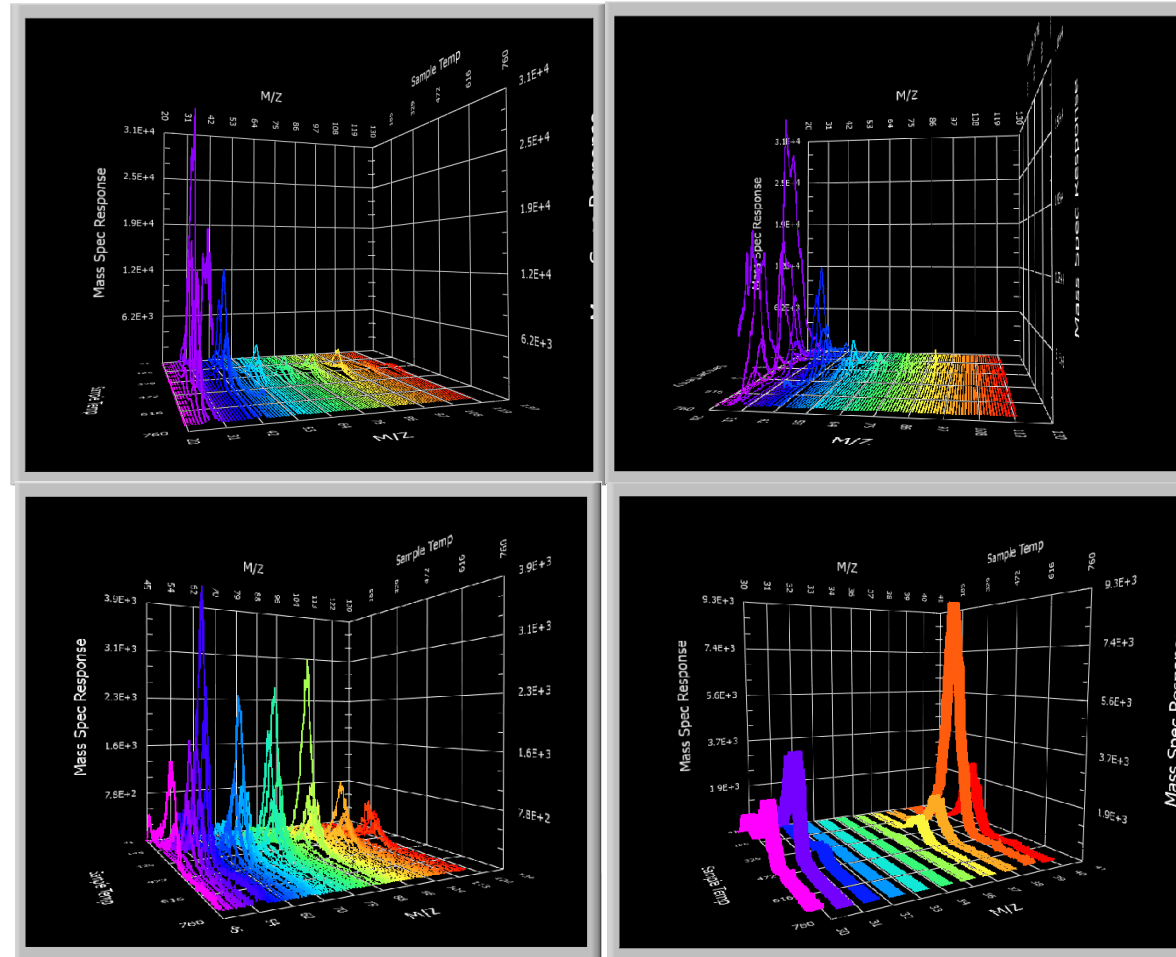
Data Analysis



- Peak fitting analysis routines.
- Integrated area.
- Baseline subtraction.

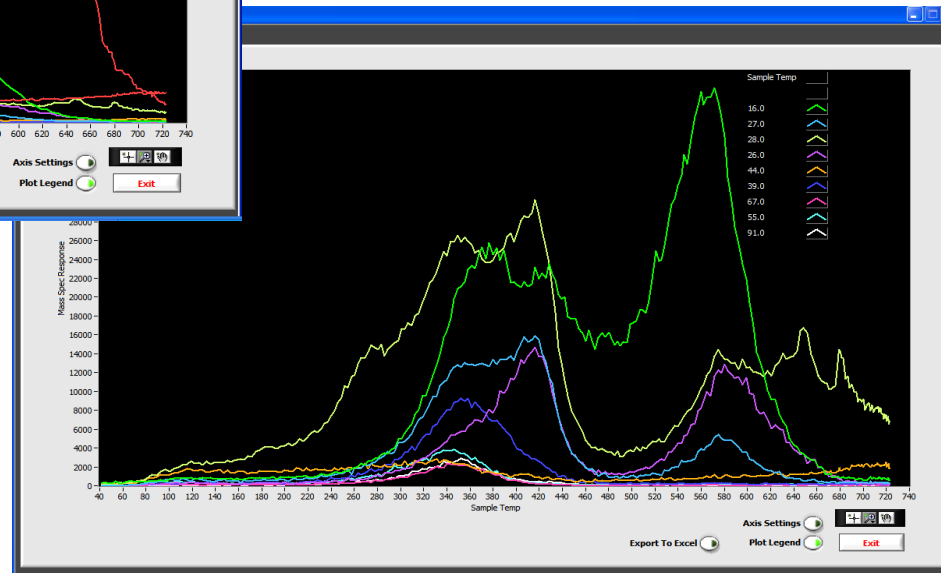
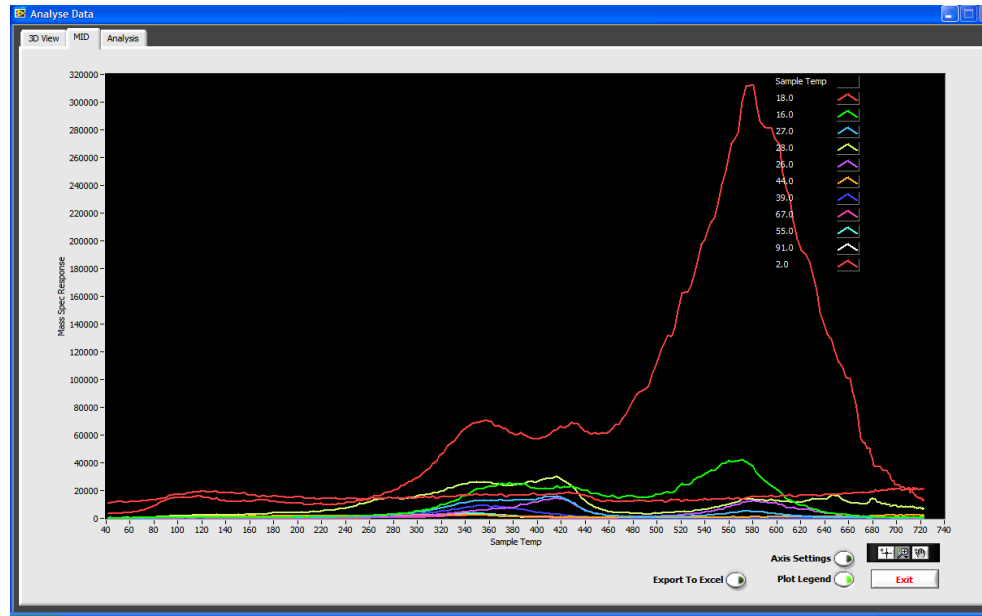
TPDsoft

3D Bar view is fully rotatable and expandable in real time allowing easier viewing of trends in mass data.

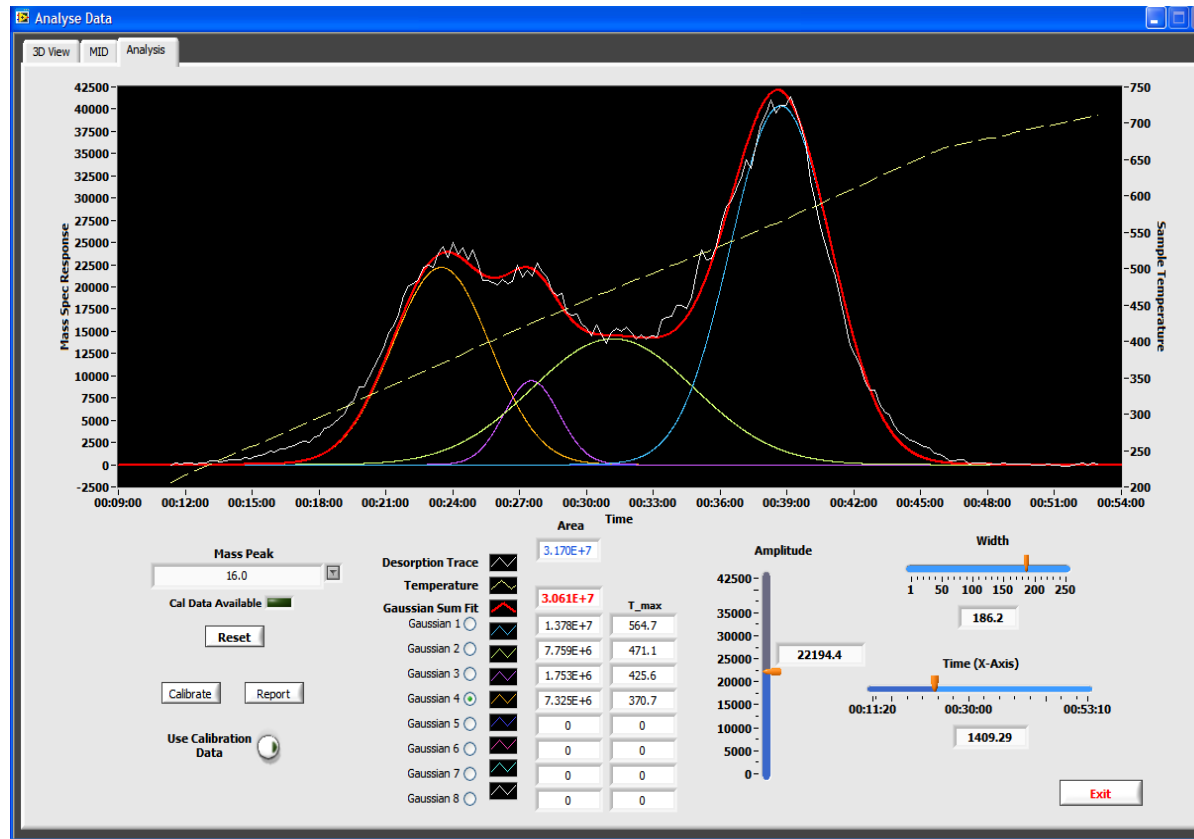


TPDsoft

Trends can be extracted from Bar scan to give MS response vs temperature (or time) plot. Data output direct to Excel.



TPDsoft



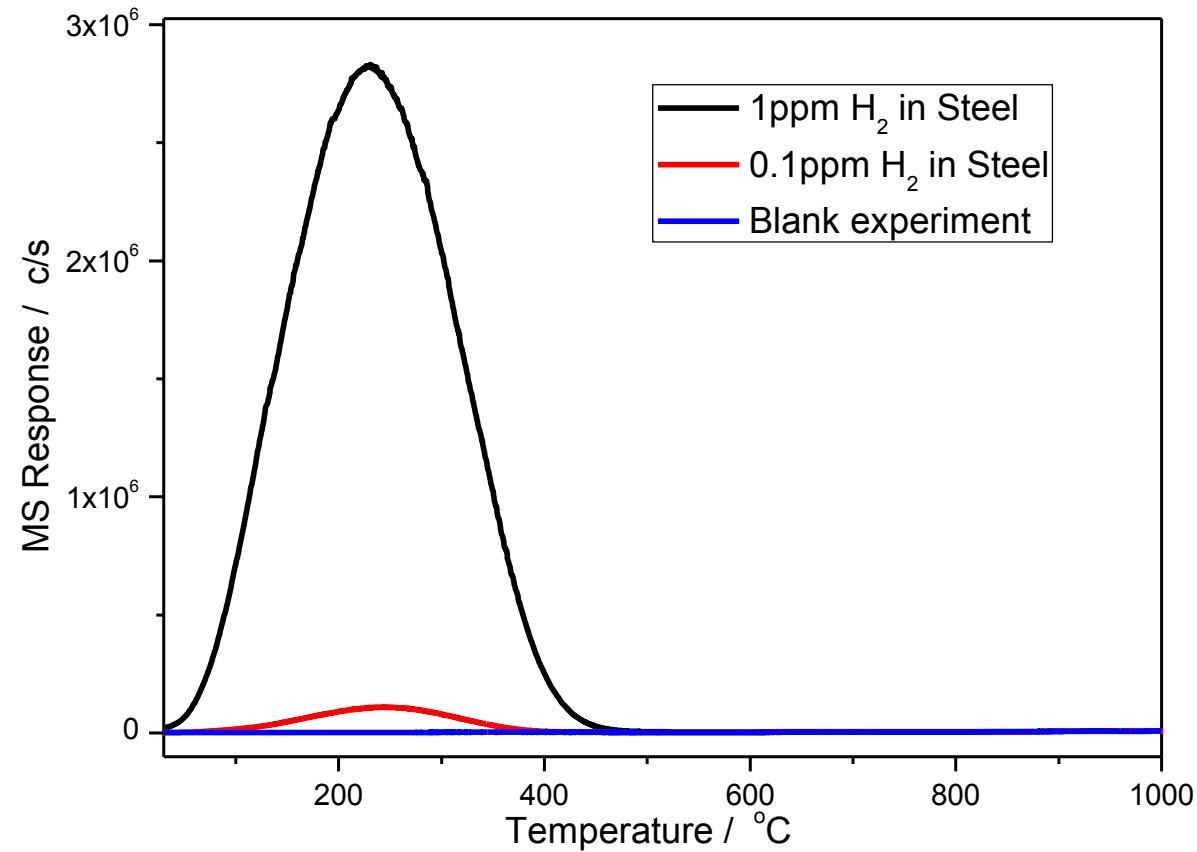
Peak fitting function for deconvolution of overlapping peaks. Output analysis to a test report.

(Note: example shown here is for illustrative purposes only)

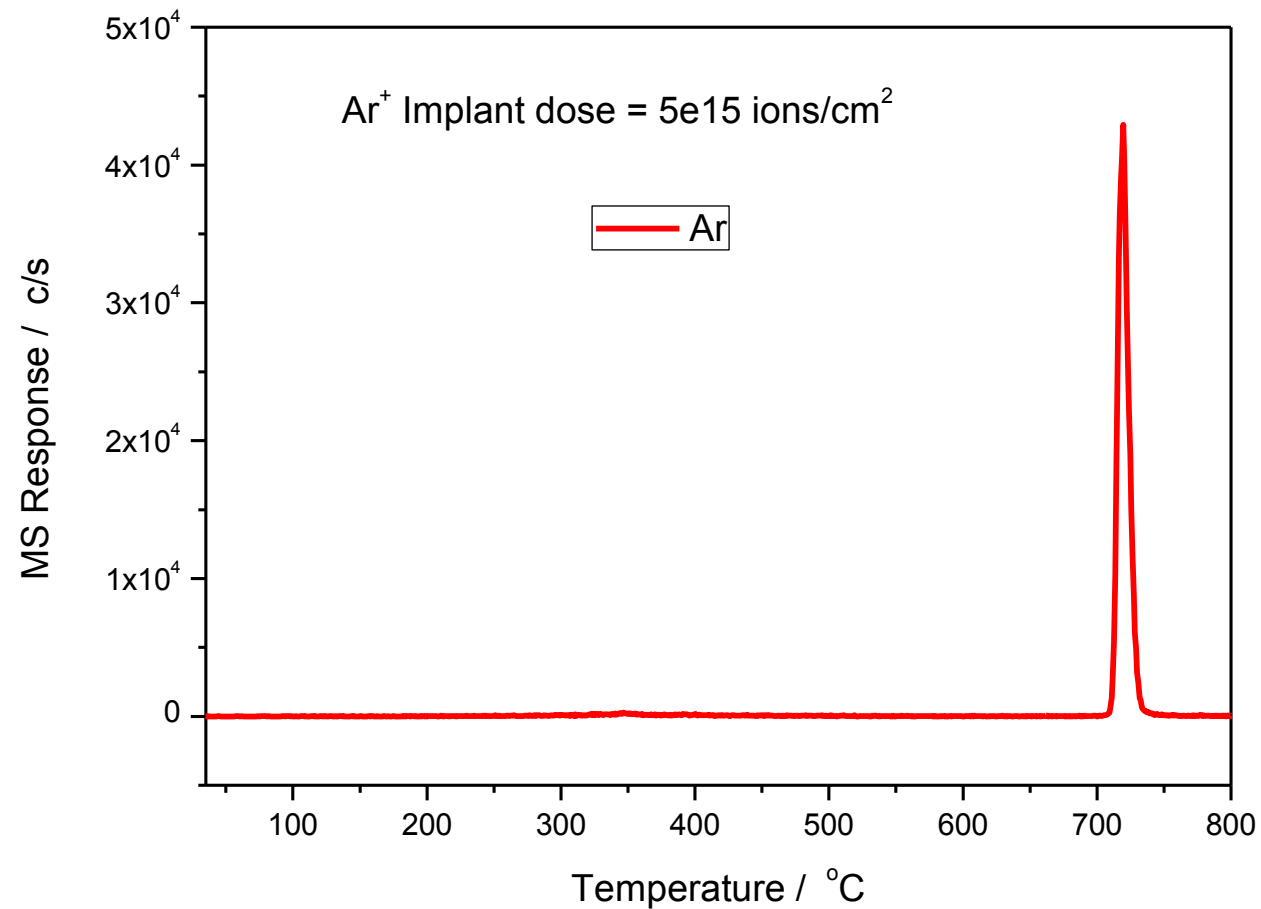
Application Areas

- Thin Films
- Photovoltaics
- Semiconductors
- Solid Oxide Fuel Cells
- Measuring contamination levels in metals (nuclear industry)

H₂ Desorption from Steel Samples



Ar⁺ implanted Si Sample



Key features

- Triple filter high performance mass spectrometer with pulse ion counting detector (Hiden 3F PIC series)
- Multiport UHV chamber
- Heated sample stage to 1000 °C (maximum sample temperature is sample dependent)
- Integrated cooling of mass spectrometer shroud and heater assembly
- Sample transfer mechanism and loadlock plus Z-drive for optimum detector positioning
- TPDsoft thermal analysis software including analysis routines
- Bakeout jacket (200 °C max.)

Recent Hidden Customers

