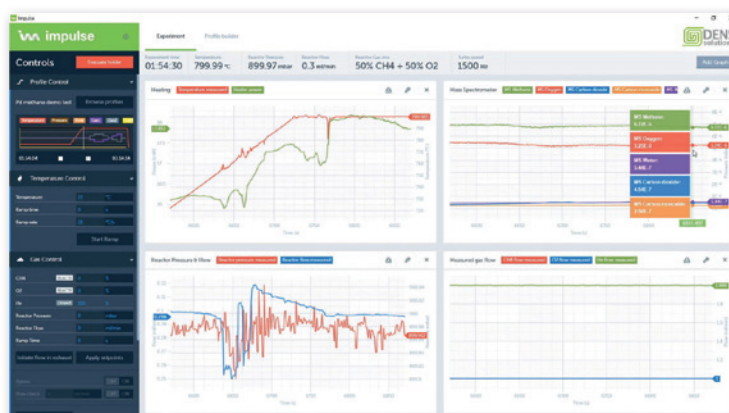


impulse software for Wildfire, Lightning and Climate systems

Introduction

Impulse 1.2 software gives researchers complete control over their stimuli. With Impulse, you can easily design your In Situ experiment from your desk. Decide which sample conditions you want to be met at which time and Impulse will do the rest. During your TEM experiment, Impulse will automatically control the sample environment while you focus on the results. Your experiment design is stored so that you can reliably reproduce your results.



For teams

Impulse is specifically designed with research groups and user facilities in mind. Are you leading a research group with long term projects involving multiple researchers? Impulse makes it easy to design, save and share experiment workflows so that the study can seamlessly continue and evolve.

If you are responsible for a multi-user TEM facility, you want to work with Impulse. Impulse has an intuitive user interface that allows control over multiple DENSsolutions In Situ systems. So researchers can start performing a wide variety of experiments using stimuli like heating, biasing and gas in no time.



Features & Benefits

1. Smart automation



Easily design your experiment with the drag-and-drop profile builder. During the experiment, you can focus on other things while smart automation keeps track of the measurements and ensures that the programmed sample conditions are met.

Thanks to its high reliability, smart automation enables you to accurately reproduce your experiments. This allows you to do multiple iterations, testing a wide scale of stimuli variations to discover which parameters are crucial to the process you want to understand.

2. Flexible dashboard

During your experiment, it is crucial to have instant access to the right information. Impulse gives you great flexibility in arranging and resizing the graphs so that you will never miss a thing.

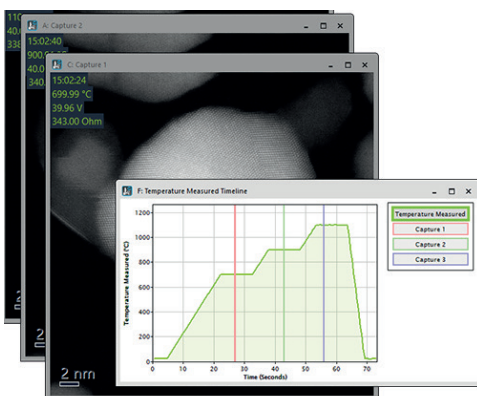
There is no limit to the amount of data you can display on the experiment dashboard. This gives you a complete status overview and allows you to quickly find correlations and make real-time decisions.



3. Data integration

Synchronize your stimuli data with other data from your experiment and provide your camera and detector images with stimuli annotations in seconds.

*Currently compatible with TVIPS and Gatan Digitalmicrograph.



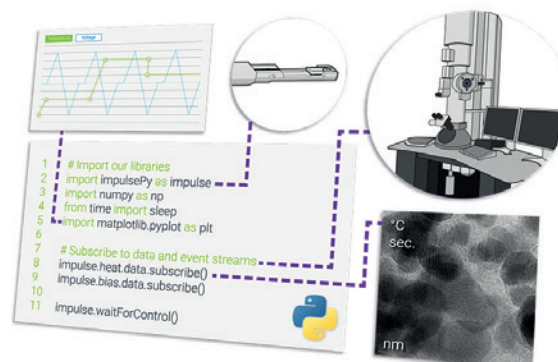
TVIPS
TETZ VIDEO AND IMAGE PROCESSING SYSTEMS

GATAN

4. Experimental freedom

Conduct unique experiments with the added optionality of creating your very own Python scripts. With Python, you will be able to communicate with different equipment like your microscope, cameras, detectors and our in-situ systems the way you please.

You can choose to create your own scripts, use our premade scripts and even access thousands of Python modules online. This experimental freedom will enable you to expand your research boundaries and exercise your creative control.



Compatibility

Impulse 1.2 software is compatible with the DENSSolutions Wildfire, Lightning, Stream and Climate* systems. Impulse connects to the DENSSolutions heating control unit (HCU), Keithley 2450 source measuring unit (SMU), PalmSens 4C potentiostat and the DENSSolutions Gas Supply System to control the heating, biasing, liquid, liquid heating, liquid biasing and gas parameters. For measurements, Impulse retrieves its data from the HCU, SMU, potentiostat, DENSSolutions Gas Supply System and DENSSolutions Gas Analyzer.

**Impulse 1.2 is backwards compatible with all Climate systems.*

For Climate users

Using the DENSSolutions Climate systems, users are confronted with a growing number of parameters. For the Climate G+, users are able to control parameters such as the sample temperature, gas flows and pressures and gas concentration. And users are able to measure parameters such as calorimetry, post-reactor gas concentrations and reactor conditions.

Impulse has been optimized to integrate these large numbers of parameters fluently in order to automate and reproduce complex experiment workflows. Combined with the ability to display an unlimited number of parameters in clear graphs makes it the first choice for any serious catalysis researcher using In Situ TEM.



What our customers says



"Impulse is very intuitive and user friendly. The interface is simple yet most effective – allowing simultaneous control of temperature and bias at the flick of a switch, including set up, acquisition and recording. This is the type of tool that helps you to carry out the experiment that you WANT to do, rather than the experiment you are ABLE to do. Way to go, DENSSolutions."

Prof. María Varela del Arco
Complutense University Madrid

"Impulse allows me to streamline my workflow. With it, I spend less time setting up my experiments and more time actually doing them, whether it is heating, biasing or both. The customization options mean I can easily control the inputs exactly as I want, whilst also letting me choose what data is fed back to me."

Dr. Jonathan Peters
University of Warwick



Controls & data

Control modes	Temperature	Bias	Gas	Liquid
Control types	Temperature	Voltage, Current, E-field	Pressure Flow control, Inlet outlet pressure control	Pressure Flow control, Inlet outlet pressure control
Control parameters	Celsius	Source (Voltage / Current / E-field) and Compliance limit	Pressure Flow control: Reactor pressure, Reactor flow, Gas1 concentration, Gas 2 concentration Inlet outlet pressure control: Inlet pressure, Outlet pressure, Gas1 flow, Gas2 flow, Gas3 flow	Pressure Flow control: Nano-Cell Flow, Outlet pressure Inlet outlet pressure control: Inlet pressure, outlet pressure
Control modes	Step, Ramp	Step, Sweep cycle	Step, Ramp	Step
Automation	Yes	Yes	Yes	No
Automation control Parameters	Degree	Voltage, Current or E-field	Pressure Flow control parameters	N.A.

Plottable parameters

1. Temperature

- Temperature measured
- Temperature setpoint
- Heater power
- Relative heater power

- Reactor flow measured
- Reactor flow setpoint
- Reactor pressure measured
- Reactor pressure setpoint
- Turbo speed
- Vacuum pressure

2. Bias

- Voltage measured
- Voltage setpoint
- Current measured
- Current setpoint
- E-field measured
- E-field setpoint
- Resistance measured
- R-T curve
- I-V curve

4. Gas Analyzer

- Channel 1
- Channel 2
- Channel 3
- Channel 4
- Channel 5
- Channel 6
- Channel 7
- Channel 8
- Channel 9
- Channel 10

3. Gas

- Gas1 concentration measured
- Gas1 concentration setpoint
- Gas2 concentration measured
- Gas2 concentration setpoint
- Gas3 concentration measured
- Gas1 flow measured
- Gas2 flow measured
- Gas3 flow measured
- Gas1 flow setpoint
- Gas2 flow setpoint
- Gas3 flow setpoint
- Inlet pressure measured
- Inlet pressure setpoint
- Outlet pressure measured
- Outlet pressure setpoint

5. Liquid

- Nano-Cell flow measured
- Nano-Cell flow setpoint
- Nano-Cell pressure measured
- Nano-Cell pressure setpoint
- Inlet pressure measured
- Inlet pressure setpoint
- Outlet pressure measured
- Outlet pressure setpoint

6. Liquid biasing

- Potential measured
- Current measured