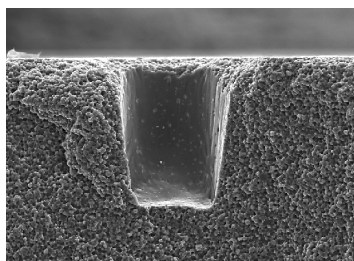


UP213 Universal Platform Laser Ablation System

UP213 is the latest generation, high-performance Nd:YAG deep UV (213nm) laser ablation system that provides flat craters and high absorption for the analysis of opaque and transparent materials alike. The 213nm wavelength produces a finer particle distribution than longer wavelengths, which results in higher transport efficiency of the aerosol leading to better sensitivity, precision and reduced fractionation

The UP213 combines the ease-of-use and low cost of ownership of a solid-state laser with the high coupling efficiency of the deep UV wavelength for solid sampling of any material. The class-leading software provides complete control of all laser parameters, multi-experiment programming, sample viewing, stage positioning, gas routing functions and two-way triggering of the ICP-MS for a fully automated ablation process.

The UP213 utilises the state-of-the-art Tempest 213nm laser, specifically manufactured by New Wave Research to have all the characteristics necessary for laser ablation. The laser has been engineered so that the beam from the fundamental (1064nm) to the final (213nm) output is completely flat-topped for the flattest craters at the sample surface.



UP213 Advantages

- Higher absorption rate at 213nm improves ablation of all materials, including fragile and easily fractured minerals.
- Unique “true” aperture imaging capability of a truly flat laser beam for the sharpest crater edges at all spot sizes.
- Tempest 213nm engineered by New Wave Research specifically for the UP213 to have the flattest beam profile. Makes analysis of thin films simple and accurate.
- Precision depth profiling and spot sizes down to 4µm make this an excellent tool for fluid inclusion analysis.
- 13 “true” aperture imaged spot sizes.
- Finer particle distribution improves transport efficiency and minimises surface deposits at the ablation site



The UP213 is controlled via New Wave Research's market leading software. High versatility and user-friendliness combined with many new features and the most powerful laser to ICP-MS interface available

New Wave Research is proud to have the most user-friendly and versatile software package available today for control of the UP213 laser ablation system. The latest version is available *free of charge* at www.new-wave.com/nwrsupport.htm.

Recently Added Features

- Adjustment of internal mass flow controllers* during experiments for easier tuning.
- Full compatibility with the new Large Format Cell.†
- Beziér curve scan function facilitating easy tracking of growth bands and features (Fig. 1)
- Drag-and-drop sequence editing of scan patterns—makes setting up long analytical runs easy.
- Visible cut path shows total area to be removed prior to ablation (Fig 2).
- Plasma protection with gas valve warning system.
- Staged ramping of internal mass flow controllers and intelligent valve switching prevents plasma blowout.
- Grouped amendment of scan pattern properties.
- Merge line scans into a single scan pattern.
- Continuous z-focus during depth profiling for constant fluence at the point of ablation.
- Compatible with Windows Vista

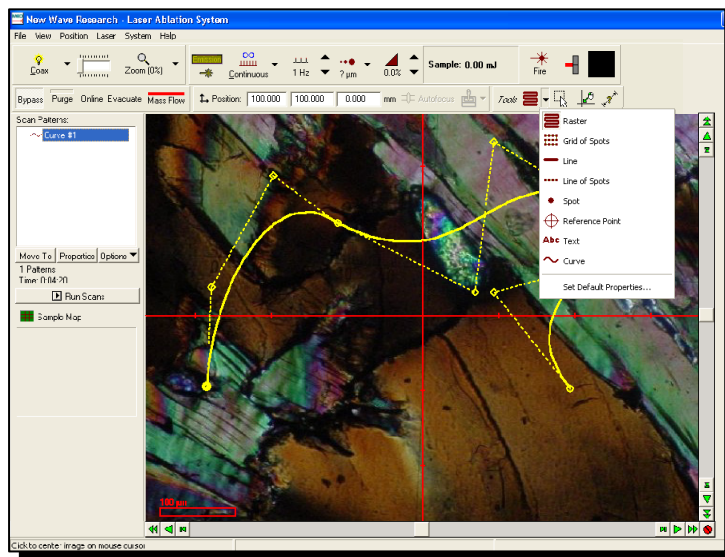


Figure 1. The new Beziér curve function allows easy tracking of mineral boundaries and growth bands.

Existing Features of LA Software

- The most versatile ICP-MS triggering software available; Trigger In and Sync Out modes for compatibility with all ICP-MS/ICP-OES systems.
- Powerful automation and manipulation of programmed experiments.
- Auto-scrolling of stages makes placing large experiments a one-step, simple process.
- 3D re-coordination of saved experiments. Go back to a sample months later without having to reprogram pattern scans.
- Mapping tool allows macro view and navigation of the whole sample—range is limited only by sample cell dimensions.
- 13 aperture imaged software-controlled spot sizes.
- Automatic Bypass/Purge/Online gas valve control.
- Duplicate, rotate and translate scans about multiple centres for rapid reconfiguration of experiments.
- Optional off-line pre-ablation with separately programmable parameters for sample cleaning and surface preparation.

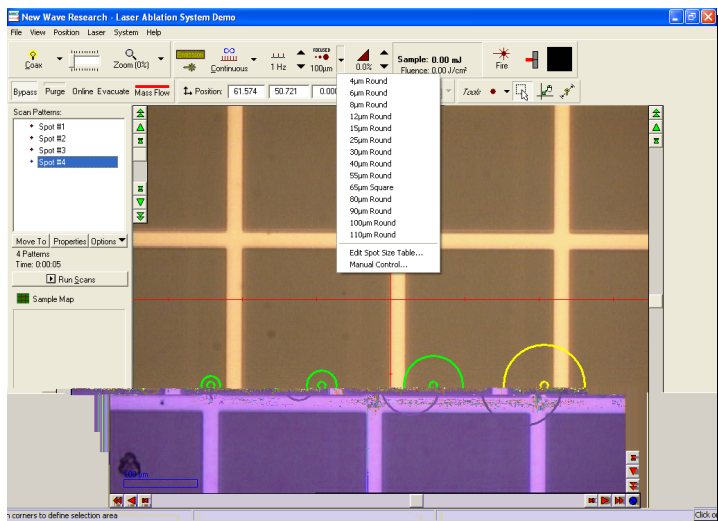
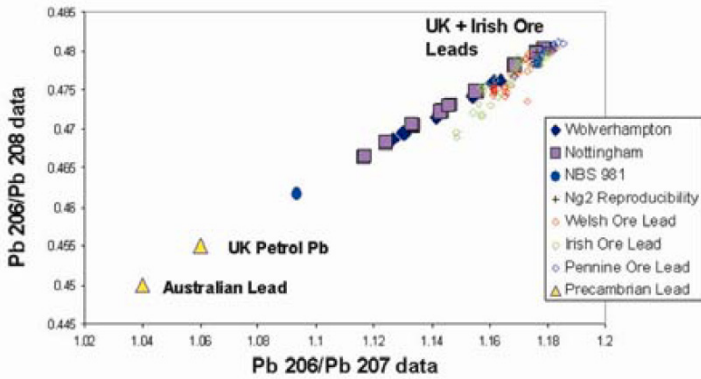


Figure 2. The new Pattern Cut Width function clearly shows the area to be ablated

The UP213 from New Wave Research benefits from a substantial installation base world-wide and a myriad of applications, including geological, materials, biological, environmental, archaeological and many more

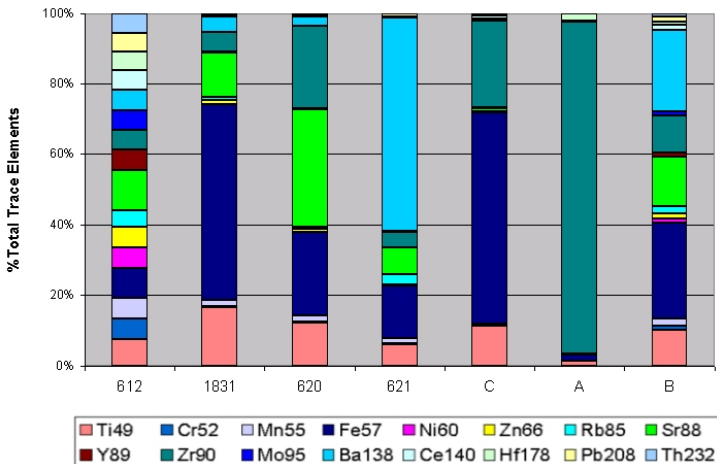
Geological

Laser ablation is now common in Geology labs world-wide for applications ranging from Pb isotope ratio dating of minerals (below) to fluid inclusion studies. Studies also include U/Pb, Sr/Sr isotope ratios and the new Os/Re chronometer.



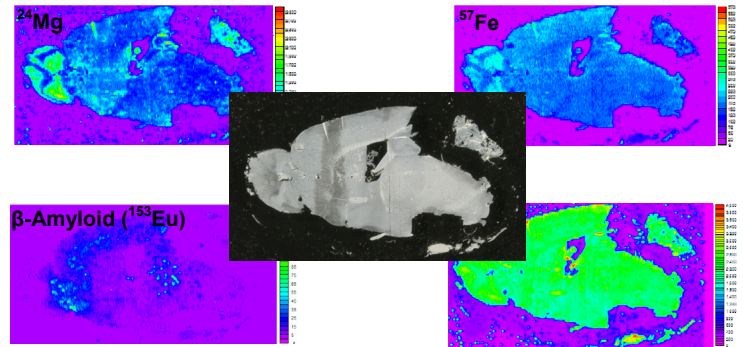
Forensic - Fingerprinting of Glass Fragments

As modern glass manufacturing techniques become standardised it is getting harder to discriminate between glass fragments on the basis of refractive index alone. LA-ICP-MS has provided the means to distinguish glass fragments with near-identical refractive indices with excellent reliability. The diagram below shows the cumulative elemental composition of 6 unknown glass samples and a NIST 612 reference material measured using a UP213.



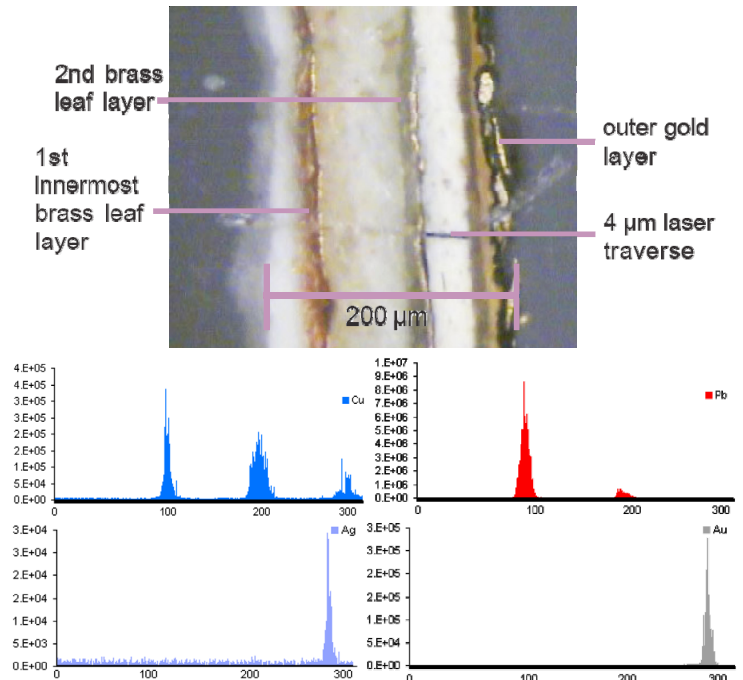
Biomedical - Mapping of Tissues

Biomedical studies of tissue require greater resolution of chemical elements and proteins than ever before in order to identify diseased states. The diagram below shows a 2D mapping experiment of ABeta protein (labelled with ^{153}Eu) and chemical elements in a section of brain tissue made using a UP213.



Archaeological - Restoration of a Fresco

A UP213 was used to analyse a cross section of ancient gilded fresco in a Slovenian church roof in order to identify the original materials used prior to restoration.



UP213—Specifications

Performance	
Laser	Tempest 213nm 20Hz
Wavelength	5th Harmonic @ 213nm
Pulse Duration	< 4ns
Repetition Rate	1 to 20Hz
Pulse Stability (1 σ)	3%
Energy Control	Optically attenuated at 1064nm for best stability
Energy @ Sample Surface	> 3 mJ
Fluence @ Sample Surface	> 30 J/cm ²
Spot Selection—Aperture Imaged Mode	13 true aperture imaged, software-controlled spots: 4 μ m to 110 μ m
Spot Selection—Focus Beam Mode*	Software-controlled motorised beam expander: 2 μ m to 300 μ m
Beam Conditioning	Flat beam profile at fundamental output
Triggering	Bi-directional control between ICP-MS and UP213 for maximum control of experiments
X-Y Stages	52mm x 52mm travel; 1 μ m resolution
Z Stages	25mm travel; 1 μ m resolution
Stage Configuration	Open architecture with viewing shield, no enclosure
Sample chamber	Quick-change drawer; 60mm ID, 50mm deep Upgradeable chamber options include CryoCell, SuperCell, Large Format Cell, Paper Cell
Sample Mapping	Mosaic sample mapping across the entire sample area
Auto-sampling	Continuous sequential analysis of an unlimited number of scans—limits operator time
Confocal Colour Video Microscope and Camera	2 μ m feature resolution with colour CCD camera. Sample is in focus for all laser spot sizes
Optical Magnification	Computer controlled motorised variable zoom with 5.6X to 36X optical magnification
Lighting	Software-controlled coaxial, ring and transmitted lighting
Polarisers	Rotating cross-polarisers as standard
Gas Handling	Software-controlled solenoid valves—purge, bypass and online
General	
Safety Classification	Fully interlocked, Class 1 system as standard
Complete System Size	Length 25" (64cm), Width 18" (46cm), Height 22" (56cm)
Complete System Weight	UP 130lbs (59kg), Power Supply 30lbs (13.6kg)
Power Requirements	UP 100-110V (AC), 3A, 50/60Hz; Power Supply 100-110V (AC), 3A, 50/60Hz UP 220-240V (AC), 3A, 50/60Hz; Power Supply 220-240V (AC), 3A, 50/60Hz
Warranty	12 Months or 30M shots as standard
Options	
Trinocular Microscope	Nikon microscope head with 15X eyepieces—fully interlocked for safe viewing
Auto-Focus	Diode laser-based auto focussing of Z-axis
Internal Mass Flow Controller	Software-controlled fully-integrated mass flow controller
Auto-Switchable	Software-controlled motorised beam expander in addition to aperture-imaged spots for greater spot size control (range 2 μ m to 330 μ m)
Alternate Sample Cells	SuperCell™, Large Format Cell, CryoCell, Paper Cell
Service Contract	Extended 12 month warranty and service contracts available

USA

New Wave Research
a division of **esi**
48660 Kato Blvd.
Fremont CA 94538-7339
United States of America
Tel: +1 510-249-1550
Tel: +1 800-566-1743
Fax: +1 510-249-1551
Email: lasers@new-wave.com

Japan

New Wave Research
a division of **esi**
Pierwest Square Northwing 2F
1-11-8 Tsukuda, Chuo-ku
Tokyo, 104-0051
Japan
Tel: +81-3-3533-8444
Fax: +81-3-3533-8443
Email: newWaveKK@new-wave.com

Taiwan

New Wave Research
a division of **esi**
2Fl., No. 58-3, XingShan Road
Neihu Dist.,
Taipei
Taiwan 114 ROC
Tel: + 886-2-8792-7585
Fax: + 886-2-8792-7584
Email: NewWaveGC@new-wave.com

Europe

New Wave Research
a division of **esi**
8 Avro Court, Ermine Business Park
Huntingdon, Cambs,
PE29 6XS
United Kingdom
Tel: + 44 1480 456566
Fax: + 44 1480 456545
Email: NewWaveEU@new-wave.com

China

New Wave Research
a division of **esi**
Room 1701~1702, Information Tower,
No.1403 Min Sheng Road,
Pudong, Shanghai, China
P.R.C. 200135
Tel: + 86 21 3392 7070
Fax: + 86 21 5237 1289
Email: NewWaveCN@new-wave.com