

UP266 MACRO

Product Introduction

Technical Note

The new **UP266 MACRO**, a large beam, 266nm, short UV Nd:YAG laser ablation system is designed to boost ICP-OES and ICP-MS sensitivity well beyond the abilities of all other 266nm laser ablation systems.

The UP266 MACRO is the first commercial, short UV, laser ablation system capable of ablating micron to millimeter sized craters in a full range of materials. From quartz glass to tree rings, from plastics to steels, from paper to gels. Built around the user-friendly Universal Platform design, features like sample mapping and targeting, automated analysis and motorized stage control are all standard features.

For many applications the process of getting the analytical material of interest into solution is a difficult, time consuming process involving the use of dangerous chemicals requiring safe handling and costly disposal. Laser ablation solid sampling analysis is growing into a practical, realistic alternative to aqueous analysis especially for difficult matrices and sample types.

Applications

- Bulk and inclusion analysis of metals
- Forensic analysis of plastics, ceramics, paints, glass, biological tissues, tree rings and gels
- Sulfate analysis
- Environmental air filters, wear metals and soils analysis

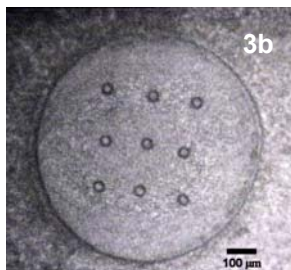
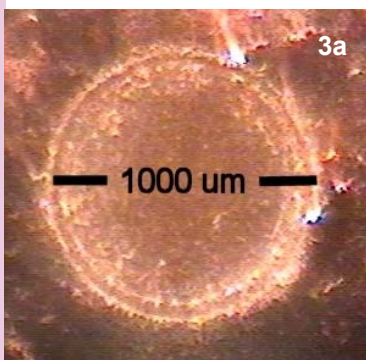


Figure 3a and 3b: Craters in brass and glass displaying the large range in spot sizes capable with the UP266 MACRO. **Fig. 3b** is a 780µm ablation crater with a raster of 30µm craters within.



UP266 MACRO large beam 266nm ablation
Label A: V.E.R.I. functional adjustment (Fig. 1)
Label B: Auxiliary gas control (Fig. 2)

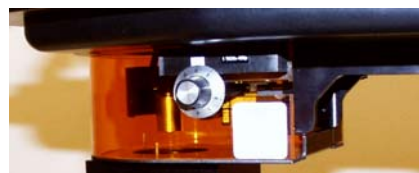


Figure 1: View of V.E.R.I. functional spot size control and Class 1 laser shield



Figure 2: Auxiliary gas control (0-1L)

Vernier **Extended Range Incremental (V.E.R.I.™)** adjustment (**Fig. 1**) offers a level of flexibility that goes beyond spot size control. Spot sizes smaller than 20 µm and greater than 1200 µm are now possible. V.E.R.I. fine tuning of analyte signal is an additional feature where spot size is not a limiting factor.

The UP266 MACRO also incorporates an integrated, high precision auxiliary gas control rotometer (**Fig. 2**). Helium cell gas control from 20 ml to 1L improves ablation characteristics and dry aerosol transport.



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Analytical Examples

With continued improvements to analytical hardware (ICP-MS & ICP-OES) and the development of high quality, certified reference materials, true quantitative analysis of solids, in-situ, is a rapidly growing practicality. New Wave Research, a leader in commercial lasers and laser ablation systems, in response to this growing analytical demand has developed the new UP266 MACRO. Due to the great flexibility and full functionality of its design, large spot size and short UV wavelength, the UP266 MACRO is capable of analyzing a wide variety of materials with a high degree of accuracy and precision.

Laser Ablation ICP Optical Emission Spectrometry

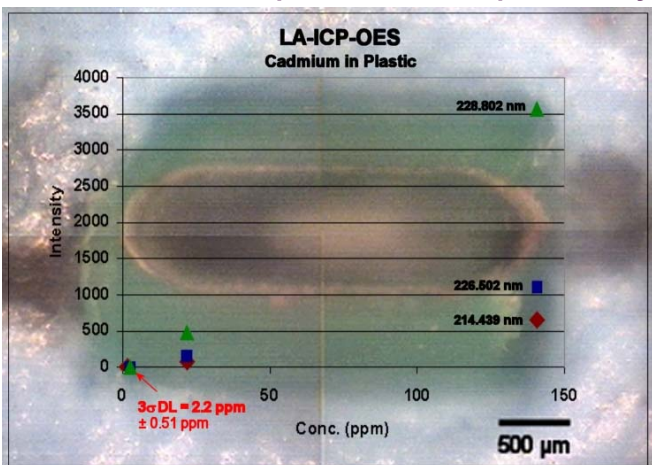


Figure 5: Line ablation in BCR 680 plastic 850µm x 2600µm Data collected on a ICP Optical Emission Spectrometer shows good correlation between three separate cadmium wavelengths with a DL of 2.2 ppm in the solid.

Laser Ablation ICP Mass Spectrometry

Glass Analysis

LA-ICP-MS

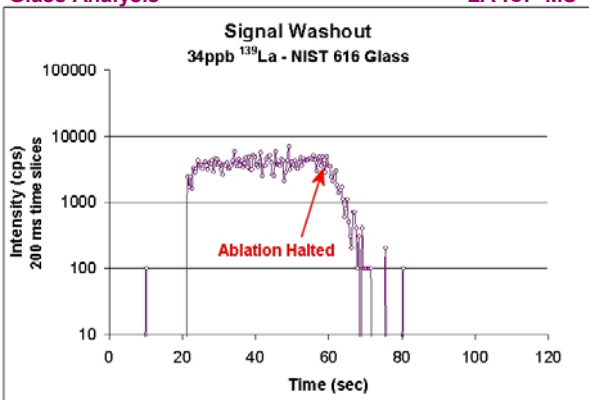


Figure 6: Quick washout time even with large volume ablation enhances detection limit capabilities.



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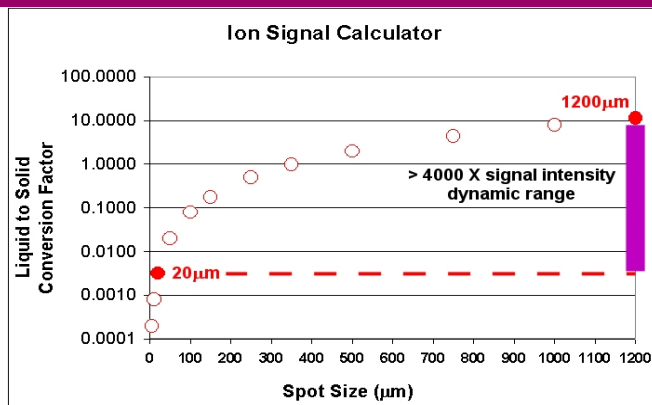


Figure 4: With an aperture imaged spot range from 20µm to 1200µm the UP266 MACRO has unparalleled flexibility.

Steel Analysis

LA-ICP-OES

Element & Wavelength	Ref. Conc. wt%	Observ. Conc. wt%	RSD	% Recovery
As 188.980	0.011	0.014	4.0	127.3
Co 228.615	0.028	0.030	1.7	107.1
Cr 267.716	0.220	0.223	2.8	101.4
Cu 324.754	0.300	0.316	2.6	105.3
Mn 257.610	0.678	0.715	1.0	105.5
Mo 204.598	0.103	0.103	2.3	100.0
Ni 231.604	1.990	2.051	2.5	103.1
P 178.222	0.040	0.039	6.8	97.5
Si 251.611	0.180	0.198	50.7	110.0
Sn 189.927	0.050	0.051	1.1	102.0
Ti 334.941	0.180	0.128	26.9	71.1
V 311.837	0.053	0.053	1.2	100.0
Zr 339.198	0.010	0.011	16.2	110.0

Table 1: Solid sampling analysis of NIST 1761 steel Quantitative analysis data collected from an ICP Optical Emission Spectrometer.

Glass Analysis

LA-ICP-MS

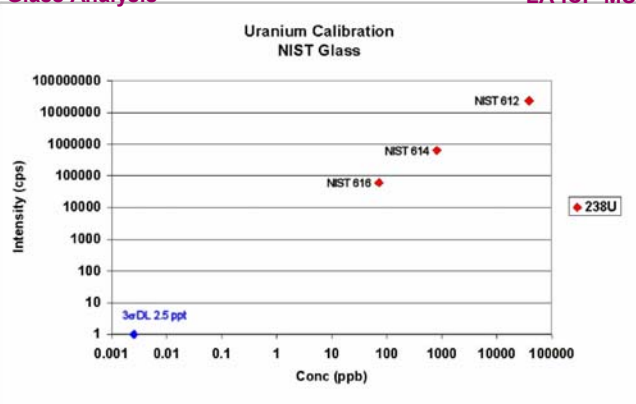


Figure 7: Uranium calibration curve - NIST glass High precision values are attainable even in the most UV transmissive glasses. 3σ detection limits calculated well below ppb levels in the solid.