



## **Purchase Contract**

(hereafter the “**Contract**”)

### **1. CONTRACTUAL PARTIES**

#### **1.1 Geologický ústav AV ČR, v. v. i.,**

with its registered office at: Rozvojová 269, 165 00 Praha 6 – Lysolaje, Czech Republic  
represented by: RNDr. Tomáš Přikryl, Ph.D., Director,  
registered in the Register of public research institutions of the Ministry of Education, Youth and Sports  
of the Czech Republic.

ID No.: 67985831

Tax ID No.: CZ67985831

Bank: [REDACTED]

Account No. IBAN: [REDACTED]; SWIFT (BIC): [REDACTED]

(hereafter the “**Buyer**”)

and

#### **1.2 Elemental Scientific Instruments France,**

with its registered office at: 23 route de la Wantzenau, 67800 Hoenheim, France,  
represented by: Dr. Aurelien Viscardi, Managing Director,  
registered at RCS Strasbourg, France.

ID No.: 824813323

Tax ID No.: FR51824813323

Bank: Crédit Agricole

Account No. IBAN: [REDACTED]; SWIFT (BIC): [REDACTED]

(hereafter the “**Seller**”),

(the Buyer and the Seller are hereafter jointly referred to as the “**Parties**” and each of them  
individually as a “**Party**”).

## 2. FUNDAMENTAL PROVISIONS

- 2.1 The Buyer is a public research institution whose primary activity is scientific research in the areas of structural geology, magnetostratigraphy, petrology, geochemistry of endogenous and exogenous processes, economic geology, phytopaleontology including microphytopaleontology, zoopaleontology of vertebrates and invertebrates and paleoecology, together with Quaternary geology, geoarchaeology and environmental sciences.
- 2.2 The Buyer wishes to acquire the subject of performance hereof for the purpose of resolving the concentration and isotope ratios of many chemical elements in a wide variety of sample media, to extremely low detection limits and wide concentration ranges.
- 2.3 The Seller was selected as the winner within **Part 2** of a public procurement procedure announced by the Buyer in accordance with Act No. 134/2016 Coll., on Public Procurement, as amended (hereafter the “**Act**”), for the public contract called “**HR ICP-MS with Excimer laser**” (hereafter the “**Procurement Procedure**”).
- 2.4 The documentation necessary for the execution of the subject of performance hereof consist of
- 2.4.1 **Technical specifications** of the subject of performance hereof attached as **Annex 1** hereto.
- 2.4.2 The Seller’s bid submitted within the Procurement Procedure in its parts which describe the subject of performance in technical detail (hereafter the “**Seller’s Bid**”) as **Annex 2** hereto.

In the event of a conflict between the Contract and its Annexes or Annexes to each other, a technical requirement of a higher level or a business condition more favorable to the Buyer always takes precedence.

- 2.5 The Seller declares that he has all the professional prerequisites required for the supply of the subject of performance under this Contract, is authorised to supply the subject of performance and there exist no obstacles on the part of the Seller that would prevent him from supplying the subject of this Contract to the Buyer.
- 2.6 The Seller acknowledges that the production and delivery of the subject of performance within the specified time and of the specified quality, as shown in Annexes 1 and 2 of this Contract (including invoicing), is essential for the Buyer. If the Seller does not fulfil the contractual requirements, the Buyer may incur damages.

## 3. SUBJECT-MATTER OF THE CONTRACT

- 3.1 The subject of this Contract is the obligation on the part of the Seller to deliver and transfer into the Buyer’s ownership:

the **193 nm ArF excimer laser system for geo-applications in connection with HR ICP-MS**

(hereafter the “**Equipment**”)

specified in detail in Annexes 1 and 2 hereto and the Buyer undertakes to take delivery of the Equipment and to pay to the Seller the agreed upon price.

- 3.2 The following activities form an integral part of the performance to be provided by the Seller:
- 3.2.1 Submission of a list containing conditions which are recommended to be met at the place of performance in order to install the Equipment;
  - 3.2.2 Transport of the Equipment incl. all accessories specified in Annexes 1 and 2 of the Contract to the place of performance, un-packaging and control thereof;
  - 3.2.3 Installation of the Equipment and its commissioning at the place of performance;
  - 3.2.4 Testing of the Equipment in order to verify its functionality and compliance with the declared parameters listed in Annexes 1 and 2 of the Contract, according to the manufacturer's instructions;
  - 3.2.5 Delivery of detailed instructions and manuals for operation and maintenance, including list of spare parts, etc. - all in Czech or English language, in electronic or hardcopy (printed) versions;
  - 3.2.6 Basic training of operators focused on controlling the Equipment after its successful installation on site - at least 2 days (1 day = 8 hours) of training of 4 operators;
  - 3.2.7 Free-of-charge warranty service during the warranty period;
  - 3.2.8 Provision of free technical support in the form of consultations, e.g. regarding fine tuning of the Equipment or its SW;
  - 3.2.9 Free software upgrades at least during the warranty period.
- 3.3 The Seller shall be liable for the Equipment and related services to be in full compliance with this Contract, its Annexes and all valid legal regulation, technical and quality standards and that the Buyer will be able to use the Equipment for the defined purpose. In case of any conflict between applicable standards it is understood that the stricter standard or its part shall always apply.
- 3.4 The delivered Equipment and all its parts and accessories must be brand new and unused.

#### **4. PERFORMANCE PERIOD**

- 4.1 The Seller undertakes to deliver and install the Equipment and hand it over to the Buyer within **2 weeks** of the Buyer's request and at the same time, if there are no obstacles not caused by the Seller, also no later than **4 months** from the date of conclusion of the Contract.
- 4.2 The Seller is obliged to notify the Buyer of the date of delivery of the Equipment at least 1 month in advance. This term is subject to the consent of the Buyer.
- 4.3 In the event that, due to obstacles on the part of the Buyer, it is not possible to deliver and hand over the Equipment on the agreed date or within the period according to Section 4.1, the Seller is not entitled to claim payment of any additional costs against the Buyer.

## 5. PURCHASE PRICE, INVOICING, PAYMENTS

- 5.1 The purchase price is based on the Seller's submitted bid and amounts to **5 600 000,00 CZK** (in words: Five millions six hundred thousand CZK) excluding VAT (hereafter the "**Price**"). VAT shall be settled in accordance with the valid Czech regulation.
- 5.2 The Price includes any and all performance provided by the Seller in connection with meeting the Buyer's requirements for the proper and complete delivery of the Equipment hereunder, as well as all costs that the Seller may incur in connection with the delivery, installation and testing of the Equipment upon handover, and including all other costs or expenses that may arise in connection with the performance of the Contract.
- 5.3 The Parties agreed that the Seller shall be entitled to invoice the Price as follows:
- 5.3.1 The Seller is entitled to issue an advance invoice in the amount up to 30 % of the Price excluding VAT after the conclusion of the Contract.
- 5.3.2 The Seller is entitled to invoice the rest of the Price after the handover protocol in accordance with Section 9.4 (hereafter the "**Handover Protocol**") will have been signed by the Buyer. In case the Equipment will be delivered with minor defects, the Price shall be invoiced after removal of these minor defects.
- 5.4 All invoices issued by the Seller must contain all information required by the applicable laws of the Czech Republic. Mandatory invoice details are as follows:
- 5.4.1 name and registered office of the Buyer,
- 5.4.2 tax identification number of the Buyer,
- 5.4.3 name and registered office of the Seller,
- 5.4.4 tax identification number of the Seller,
- 5.4.5 registration number of the invoice,
- 5.4.6 scope of the performance (including the reference to this Contract),
- 5.4.7 the date of the issue of the invoice,
- 5.4.8 purchase Price,
- 5.4.9 the date of conclusion of the Contract and its registration number, which the Buyer shall communicate to the Seller based on Seller's request before the issuance of the invoice,
- and it must comply with the double taxation agreements, if applicable.
- 5.5 The Buyer prefers electronic invoicing with the invoices being delivered to [uctarna@gli.cas.cz](mailto:uctarna@gli.cas.cz).
- 5.6 Invoices shall be payable within thirty (60) days of the date of their delivery to the Buyer. Payment of the invoiced amount means the date of its remittance to the Seller's account.

5.7 If an invoice is not issued in conformity with the payment terms stipulated by the Contract or if it does not comply with the requirements stipulated by law, the Buyer shall be entitled to return the invoice to the Seller as incomplete, or incorrectly issued, for correction or issuance of a new invoice, as appropriate, within five (5) business days of the date of its delivery to the Buyer. In such a case, the Buyer shall not be in delay with the payment of the Price or part thereof and the Seller shall issue a corrected or new invoice with a new and identical maturity period commencing on the date of delivery of the corrected or newly issued invoice to the Buyer.

5.8 The Buyer shall be entitled to unilaterally set off any of his payments against any receivables claimed by the Seller due to:

5.8.1 damages caused by the Seller,

5.8.2 contractual penalties.

5.9 The Seller shall not be entitled to set off any of his receivables against any part of the Buyer's receivable hereunder.

## **6. OWNERSHIP TITLE**

Ownership of the Equipment and the associated risk of damage is transferred to the Buyer upon proper handover of the Equipment in accordance with Section 9.4 of the Contract.

## **7. PLACE OF PERFORMANCE**

The place of performance (delivery, installation and handover of the Equipment) shall be the room No. 305 (third floor) in the premises of the Institute of Geology of the Czech Academy of Sciences at the address Rozvojová 269, 165 00 Praha 6 – Lysolaje, Czech Republic.

## **8. COOPERATION OF THE PARTIES**

8.1 The Seller undertakes to notify the Buyer of any obstacles on his part, which may negatively influence proper and timely delivery and/or handover of the Equipment.

8.2 The Seller is obliged to notify the Buyer of inappropriate readiness of the place of performance, if possible.

## **9. DELIVERY, INSTALLATION, HANDOVER AND ACCEPTANCE**

9.1 The Seller shall transport the Equipment at his own cost to the place of performance. If the shipment is intact, the Buyer shall issue delivery note for the Seller.

9.2 The Seller shall perform and document the installation of the Equipment and launch the tests according to Section 3.2.4 hereof in order to verify whether the Equipment is functional and meets the technical requirements of Annexes 1 and 2 hereof.

9.3 Handover shall include any and all technical documentation pertaining to the Equipment, user manuals and certificate of compliance of the Equipment and all its parts and accessories with approved standards.

- 9.4 The acceptance of the Equipment shall be completed in a joint handover procedure (with Part 2 of this public contract) confirmed by the Handover Protocol. The Handover Protocol shall contain the following mandatory information:
- 9.4.1 Information about the Seller, the Buyer and any subcontractors;
  - 9.4.2 Description of the Equipment including description of all components and their serial / production numbers;
  - 9.4.3 Description of executed tests according to Section 3.2.4 of the Contract and their results;
  - 9.4.4 Confirmation of the basic operator training according to Section 3.2.6 hereof, including a list of participants and information on its extent;
  - 9.4.5 List of technical documentation including manuals;
  - 9.4.6 Eventually reservation of the Buyer regarding minor defects including the manner and deadline for their removal and
  - 9.4.7 Signatures of the representatives of both Parties according to Sections 11.1 and 11.2 and the date thereof.
- 9.5 Handover of the Equipment does not release the Seller from liability for damage caused by its defects.
- 9.6 The Buyer shall not be obliged to accept Equipment, which would show defects (even those that do not - on their own or in connection with other defects - constitute an obstacle to the use of the Equipment). In this case, the Buyer shall issue a record containing the reason for his refusal to accept the Equipment.
- 9.7 Should the Buyer not exercise his right not to accept the Equipment with a defect, the Seller and the Buyer shall list all defects found in the Handover Protocol, including the manner and deadline for their removal. Should the Parties not be able to agree in the Handover Protocol on the deadline for removal of the defects, it shall be understood that all defects shall be removed / rectified within 7 days from the handover of the Equipment.

## **10. PROVISION OF TECHNICAL SUPPORT**

In accordance with Section 3.2.8 hereof, the Seller is obliged to provide the Buyer with free consultations and technical support related to the Equipment during the warranty and post-warranty periods.

## **11. REPRESENTATIVES, NOTICES**

- 11.1 The Seller authorized the following representatives to communicate with the Buyer in all matters relating to the Equipment delivery, installation and handover:



- 11.2 The Buyer authorized the following representatives to communicate with the Seller in all matters relating to the Equipment delivery, installation and handover:



- 11.3 The representatives according to Sections 11.1 and 11.2 can be changed by a unilateral written declaration of the Party delivered to the other Party.
- 11.4 All notifications made between the Parties pursuant to this Contract, unless otherwise specified in the Contract, must be delivered to the other Party in person (with confirmed receipt) or by registered post (to the Buyer's or Seller's address), or in some other form of registered post or electronic delivery incorporating electronic signature (qualified certificate) to [uctarna@gli.cas.cz](mailto:uctarna@gli.cas.cz) in case of the Buyer and to [esifrancesales@icpms.com](mailto:esifrancesales@icpms.com) in case of the Seller.
- 11.5 In all technical and expert matters (discussions on the Equipment testing, notification of the need to provide warranty or post-warranty service, technical assistance etc.), electronic communication between technical representatives of the Parties will be acceptable using e-mails specified in Sections 11.1 and 11.2.

## **12. TERMINATION**

- 12.1 This Contract may be terminated early by agreement of the Parties or by withdrawal from the Contract on the grounds stipulated by law or in the Contract.
- 12.2 The Buyer is entitled to withdraw from the Contract without any penalty from the Seller in any of the following events:
- 12.2.1 The Seller is in delay with the delivery of the Equipment longer than 1 month after the date pursuant to Section 4.1 hereof.
  - 12.2.2 The technical parameters or other conditions set out in the technical specifications defined in Annexes 1 and 2 to this Contract and in the relevant applicable technical standards will not be met by the Equipment at handover.
  - 12.2.3 The Seller is more than 2 weeks in delay with the removal of Equipment defects listed in the list of detected defects of the Handover Protocol according to Section 9.7.
  - 12.2.4 Facts emerge bearing evidence that the Seller will not be able to deliver and/or hand over the Equipment.
  - 12.2.5 The Seller has breached the obligations specified within the conditions of the Procurement Procedure, in particular the obligations arising from the affidavit which forms Annex 3 to this Contract, necessary for the selection of an economic operator according to Section 2.3 of this Contract.

- 12.3 The Seller is entitled to withdraw from the Contract in the event of the Buyer being in default with the payment for more than 1 month with the exception of the cases when the Buyer refused an invoice due to defect on the delivered Equipment or due to breach of the Contract by the Seller.
- 12.4 Withdrawal from the Contract becomes effective on the day the written notification to that effect is delivered to the other Party. The Party which had received performance from the other Party prior to such withdrawal shall duly return such performance within 30 days from the date of sending the notification of withdrawal by the withdrawing Party, unless the withdrawing Party sets a longer period.
- 12.5 In the event of early termination of the Contract, the Seller is obliged to ensure the removal of the Equipment from the place of performance within 30 days from the date on which withdrawal from the Contract became effective. The Buyer will provide the Seller with the necessary cooperation similar to the cooperation during the installation of the Equipment. The cost of removal shall be paid by the Party which caused the premature termination of the Contract by breaching it.

### **13. INSURANCE**

- 13.1 The Seller undertakes to insure the Equipment against all risks, in the amount of the Price for the entire period commencing when transport of the Equipment starts until duly handed over to the Buyer. In the case of breach of this obligation, the Seller shall be liable to the Buyer for any damage that may arise in connection thereof.
- 13.2 The Seller is liable for the damage that he has caused. The Seller is also liable for damage caused by third parties undertaken to carry out performance or its part under this Contract.

### **14. WARRANTY TERMS**

- 14.1 The Seller shall provide warranty for the quality of the Equipment and all its accessories for a period of **36 months** (24 months as standard + 12 extra months).
- 14.2 The warranty period shall commence on the day following the date of signing of the Handover Protocol pursuant to Section 9.4 hereof. The warranty does not cover consumable parts. Consumable parts for the purposes of the Contract are understood as items contained within the Equipment, which are consumed at regular intervals during the normal use of the Equipment, i.e. parts which have a defined typical lifetime, that does not exceed the warranty period provided the Equipment is used with normal frequency.
- 14.3 The Seller undertakes to provide free servicing of the Equipment through authorized technicians and free regular service inspection at the place of performance to the extent specified by the Equipment manufacturer and by the Contract for the entire warranty period according to this Contract, including repairs, delivery of spare parts, transport and work of an authorized service technician further specified in Annex 1 hereto.
- 14.4 Should the Buyer discover a defect, he shall notify the Seller to rectify such defect using the e-mail address: [esifrancesales@icpms.com](mailto:esifrancesales@icpms.com). The Seller is obliged to notify the Buyer without delay about any change of this e-mail address.
- 14.5 The Seller shall be obliged to review any warranty claim within 48 hours (within business days) from its receipt and to propose solution. In case the nature of the claimed defect requires to be dealt with by a



qualified technician, such person must be sent and must appear at the place of performance within 5 business days from receipt of the above-mentioned warranty claim. All the above remains in effect unless agreed otherwise by the Parties. During the warranty period, the Seller shall be obliged to rectify any claimed defects within 15 days from receipt of the Buyer's notification. In cases of unusual defects, the Seller shall be obliged to rectify the defect in the period corresponding to the nature of the defect and to define the deadline for the handover of the rectified Equipment.

- 14.6 During the warranty period, any and all costs associated with defect rectification / repair including transport and travel expenses of the Seller shall be always borne by the Seller.
- 14.7 The repaired Equipment shall be handed over by the Seller to the Buyer on the basis of a protocol confirming removal of the defect (hereinafter the "**Repair Protocol**"). If the Equipment is delivered duly repaired and defect-free, the Buyer will confirm the Repair Protocol.
- 14.8 The repaired portion of the Equipment shall be subject to a new warranty term in accordance with Section 14.1 which commences to run on the day following the date when the Repair Protocol was executed. At the same time, the aggregate length of the warranty period of the repaired portion of the Equipment shall be a maximum of twice the warranty period according to Section 14.1.
- 14.9 If the Equipment shows defects for which it cannot be demonstrably used to its full extent for more than 60 days (defect period) during six or fewer consecutive months of the warranty period, the Seller is obliged to eliminate the defect by delivering a new Equipment without defects within a period of 60 days from receipt of the Buyer's notification, unless the Parties agree otherwise.
- 14.10 The Seller undertakes to provide paid post-warranty [out-of-warranty] service at the place of performance, including repairs, delivery of spare parts and transport and work of a service technician further specified in Annex 1 hereto, under the conditions of Sections 14.4 and 14.5 and at a price not exceeding the usual price also for a minimum period of 7 years after the expiration of the warranty.

## **15. CONTRACTUAL PENALTIES**

- 15.1 The Buyer shall have the right to a penalty in the amount of 0.1 % of the Price for each commenced day of delay with the performance pursuant to Sections 4.1 and 14.9 hereof.
- 15.2 The Buyer shall have the right to a penalty in the amount of 1.500,00 CZK for each commenced day of delay with rectifying of defects claimed pursuant to Section 14.4 and 14.10 hereof.
- 15.3 In the event of withdrawal from the Contract due to the reason according to Section 12.2.2 hereof, the Buyer is entitled to apply a contractual penalty in the amount of 10 % of the Price against the Seller.
- 15.4 In the event that the Seller has committed to provide service support through a Czech-speaking technician in his Bid and does not fulfil this obligation, the Buyer has the right to a penalty in the amount of 10.000,00 CZK for each such case of non-fulfilment.
- 15.5 In the case of default in payment of any due receivables (monetary debt) under the Contract, the defaulting Buyer or Seller (the debtor) shall be obliged to pay a contractual penalty in the amount of 0.1 % of the owed amount for each commenced day of delay with the payment.
- 15.6 Contractual penalties are payable within 30 days of notification demanding payment thereof.

15.7 Payment of the contractual penalty does not prejudice the rights of the Parties to claim damages.

15.8 Payment of any contractual penalty cannot be demanded if the breach of the contractual obligation causes force majeure.

## **16. DISPUTES**

In the event that any dispute cannot be resolved by negotiations, the dispute shall be resolved by the competent court in the Czech Republic based on application of any of the Parties; the court having jurisdiction will be the court where the seat of the Buyer is located. Disputes shall be resolved exclusively by the law of the Czech Republic.

## **17. FINAL PROVISIONS**

17.1 This Contract may be changed or supplemented solely by means of numbered amendments in writing, furnished with the details of time and place and signed by duly authorised representatives of the Parties. The Parties expressly reject modifications to the Contract in any other manner.

17.2 The Parties agree that the Contract as a whole, including all attachments, will be published in accordance with Act No. 340/2015 Coll. on special conditions for the effectiveness of some contracts, publication of these contracts and Contract Register, as amended. The Buyer shall ensure the publication of the Contract.

17.3 This Contract becomes effective as of the day of its publication in the Contract Register.

17.4 The following Annexes form an integral part of the Contract:

Annex 1: Technical specification on the subject of performance

Annex 2: Technical description of the Equipment as presented in Seller's bid

Annex 3: Affidavit according to § 6 paragraph 4 of the Act No. 134/2016 Coll.

17.5 The Parties declare that they have read the Contract, understand its content and agree with it, as proof of which they attach their signatures.

In Prague 26. 6. 2024

In Hoenheim 25. 6. 2024

For the Buyer:

For the Seller:

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RNDr. Tomáš Přikryl, Ph.D.  
Director

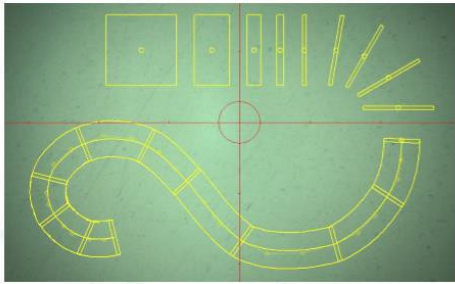
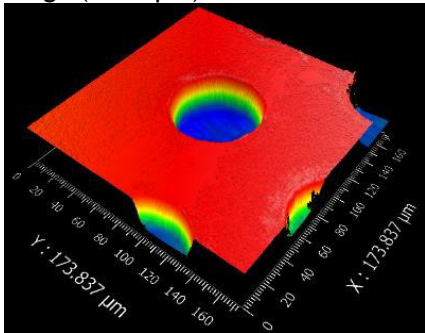
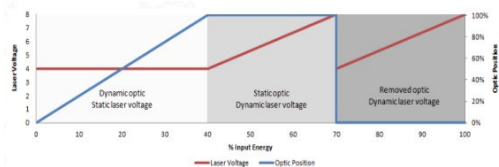
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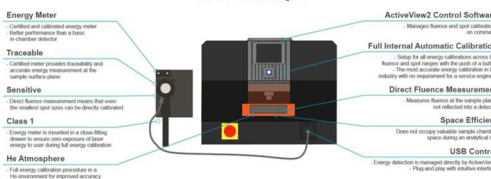
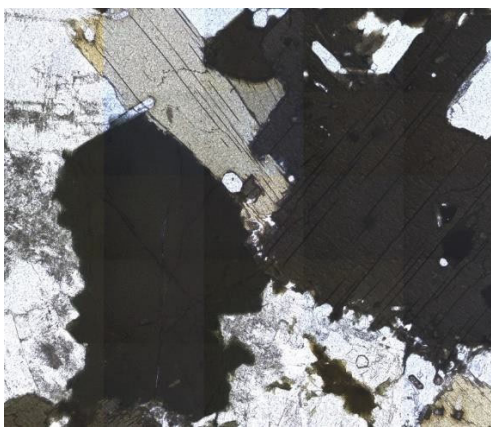
Dr. Aurelien Viscardi  
Managing Director


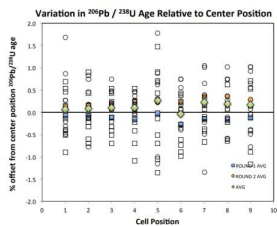
## Annex 1 - Technical specification on the subject of performance

Tab. 1 – The Equipment must meet the technical conditions and include components listed in this table.

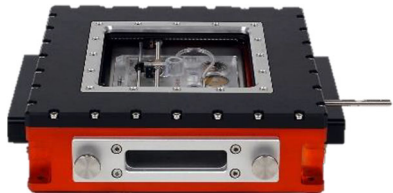
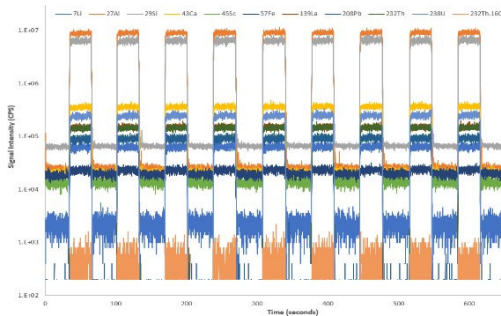
No.	Description and minimum specification of the Equipment as defined by the Buyer	Description and specification of the Equipment offered by the Seller	Complies YES/NO
<b>A</b>	<b>Laser system</b>		
1	Air-cooled ArF 193 nm laser source producing laser beam with energy fluence of at least 15 J/cm <sup>2</sup> and repetition rate in range at least 5-300 Hz.	<p>Laser Source: an air-cooled ExciStar 500 ArF-excimer laser, producing a fundamental wavelength of 193nm.</p> <p>Repetition rates from 1 to 500 Hz in 1 Hz increments.</p> <p>Low amount of optics for maximum energy transmission of &gt;15 J/cm<sup>2</sup> at the sample.</p> <p>Laser head warranty of 3 billion shots or 2 years, whichever comes first.</p>	Yes
2	Circle apertures producing ablation craters at the focused sample surface of spot size in range at least 5-100 micron with max step 3 micron between 5-30 micron and then max step 10 micron between 30-100 micron spot size.	<p>ImageGEO193 spot size between 1 and 150 µm</p> <p>ESL's unique IVA (<a href="#">Patent EP 2795283 B1</a>) provides circular spots, selectable in 1 µm increments (steps) across the entire range. Aperture imaging of the beam shaping device ensures crisp and clean spots on the sample.</p>  <p>The IVA is combined in the beam with the XYR to provide both circles and square selection within software (no need to change hardware). This combination provides the greatest flexibility in spot size and shape selection of any laser ablation system.</p>	Yes
3	X-Y dynamic rotating aperture capable of producing square and rectangle ablation craters and non-linear rasters.	XYR provides rectangular spots, selectable in 1µm increments in both X and Y, with dynamic rotation in 1° increments for non-linear rasters	Yes




		 <p>The XYR provides rectangular spots on the sample and can be used to maximise sensitivity whilst retaining spatial resolution in the direction of travel, perfect for growth band analysis.</p>	
4	Homogenous energy across the laser beam producing flat bottom craters of the ablated material for all available spot sizes.	<p>ESL's imageGEO193 utilizes a bespoke homogenizer design and aperture imaged spot shaping to provide flat and clean ablation pits across the entire spot size range (1-150<math>\mu</math>m).</p>  <p>Flat bottom craters are key for depth profiling and minimising downhole fractionation effects.</p>	Yes
5	Device for laser energy attenuation producing laser beam with energy output in range of at least 10-100% of the incoming energy with max. 5% incremental steps.	<p>ImageGEO193 includes a bespoke attenuation optic for controlling laser energy delivered to the sample. Used in conjunction with laser source energy provides energy control from 0 to 100% in 0.1% increments, perfect for controlled optimisation of any sample type.</p>  <p>The imageGEO is operated between 4 mJ and 8 mJ with and without attenuator in 3 modes, retaining pulse stability (&lt;2%RSD) whilst providing high resolution energy control to yield fluence at the sample from 0.1 to &gt;15 J/cm<sup>2</sup>. As such the fluence control of the imageGEO provides</p>	Yes

		great energy stability across the entire range.																
6	Energy meter/device capable of monitoring/measuring the energy of laser beam inside the cell at the same position where the sample surface is at normal circumstances.	<p>ESL's CaliDrawer uses an energy meter positioned at the same position as the sample surface to accurately measure and calibrate fluence. The CaliDrawer is the only system to offer actual measurement by the user at the sample surface, in a helium environment for the most accurate energy measurement, whilst retaining Class1 operation.</p> <p>AutoCal Features Diagram</p> 	Yes															
7	Power supply 220–240V (AC); 50/60 Hz.	<table><tr><th>Device</th><th>Input*</th><th>Power (kW)</th></tr><tr><td>Excimer Laser</td><td>230 +/-10% VAC, 6.3 A, 50/60 Hz</td><td>1.32</td></tr><tr><td>Ablation Platform</td><td>110/240 VAC, 6/3 A, 50/60 Hz</td><td>0.66</td></tr><tr><td>Monitor (LCD)</td><td>110/240 VAC, 1/5 A, 50/60 Hz</td><td>~0.10</td></tr><tr><td>Total</td><td></td><td>~2.00</td></tr></table>	Device	Input*	Power (kW)	Excimer Laser	230 +/-10% VAC, 6.3 A, 50/60 Hz	1.32	Ablation Platform	110/240 VAC, 6/3 A, 50/60 Hz	0.66	Monitor (LCD)	110/240 VAC, 1/5 A, 50/60 Hz	~0.10	Total		~2.00	Yes
Device	Input*	Power (kW)																
Excimer Laser	230 +/-10% VAC, 6.3 A, 50/60 Hz	1.32																
Ablation Platform	110/240 VAC, 6/3 A, 50/60 Hz	0.66																
Monitor (LCD)	110/240 VAC, 1/5 A, 50/60 Hz	~0.10																
Total		~2.00																
B	Imaging																	
8	At least HD quality of camera with resolution at least 3.5 MPx, with coaxial, ring and transmitted lighting at the sample surface	<p>The imageGEO193 is configured with an ultra-HD 5MP microscope camera, coaxially aligned to the laser beam.</p>  <p>Additionally, an off-axis wide angle camera with 25 mm field of view is used for navigation (TwoVol2 only and unique to ESL systems). Combined magnification between 2.5 and 60 times.</p> <p>High intensity LED lighting:</p> <ul style="list-style-type: none"><li>- Reflected<ul style="list-style-type: none"><li>o Coaxial</li><li>o Ring/flood.</li></ul></li><li>- Transmitted</li></ul> <p>All lighting is independently optimisable in software.</p>	Yes															

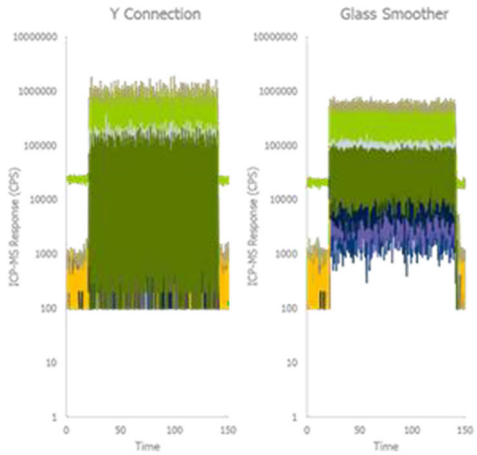
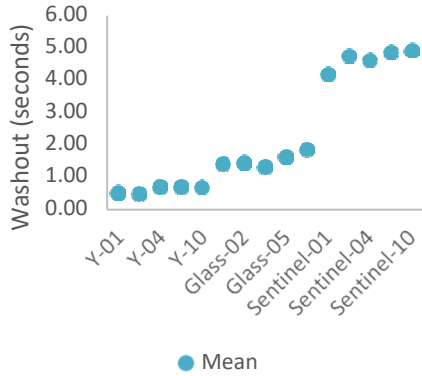
9	Optical polarizer	<p>Dual cross polarisers are provided as standard for identification of different minerals.</p> 	Yes
C	Stage and sample holder		
10	Two-volume cell with large cell for accommodation of multiple sample insert (sample holder) and small volume cell for laser ablation with efficient aerosole collection and transport.	<p>The imageGEO193 is supplied with the high-performance TwoVol2, comprising a large outer chamber for samples and a smaller inner cup for efficient aerosol collection. The TwoVol2 is the most utilised laser ablation chamber for geochronology</p>  <ul style="list-style-type: none"> <li>The average <math>^{206}\text{Pb}/^{238}\text{U}</math> Age variation (<math>n = 9</math>) is less than 1% for all chamber positions relative to the center position</li> <li>Offsets of individual analyses relative to the center position are less than 2%.</li> </ul> <p>Stage XY: 100 x 100 mm  Objective/focus: 50 mm  Stage step resolution: 0.16 <math>\mu\text{m}</math>  Stage precision: 1 <math>\mu\text{m}</math>  Stage long term precision: 3 <math>\mu\text{m}</math>  ImageLock stage return accuracy: &lt;1 <math>\mu\text{m}</math>  Washout: 700ms to 1% (configurable up to 2s with mixing bulb [high precision isotope ratio analysis] and down to 50 ms with the DCI [imaging applications]).</p>	Yes



		 <p>Note, as an option the CAS may chose to upgrade from the standard TwoVol2 to either of the options below at an additional cost of \$20,000:</p> <ul style="list-style-type: none"> <li>• 150 x 150 mm LFCTwoVol2</li> <li>• 100 x 100 mm TwoVol3</li> </ul>	
11	Signal reproducibility across the whole sample cell surface better than 5% RSD.	<p>A combination of efficient aerosol capture by the inner cell, fixed inlet geometries and Typhoon purge results in a spatially related signal reproducibility of &lt;2%RSD across the entire chamber. Typhon purge works in as little as 2 minutes to provide the lowest gas background when compared with simple dilution or vacuum purge methods.</p> 	Yes
12	Stage position return accuracy better than 3 micron	<p>TwoVol2 stage step resolution: 0.16 <math>\mu\text{m}</math>  Stage precision: 1 <math>\mu\text{m}</math>  Stage long term precision: 3 <math>\mu\text{m}</math>  ImageLock stage return accuracy: &lt;1 <math>\mu\text{m}</math></p> <p>Note that TwoVol3 stage step resolution is 0.01 <math>\mu\text{m}</math> and a return accuracy of 0.1 <math>\mu\text{m}</math>.</p>	Yes
13	Sample holder(s) that allow for placing into the cell: 1) Combination of at least 6 individual 1-inch polished sections (resin pucks) together with at least 2 individual 0.5-inch polished sections (small resin pucks)	<p>3 inserts are provided:</p> <ul style="list-style-type: none"> <li>- A 9-puck holder (for 9 x 1" round mounts and 2 x 1/2" mounts).</li> </ul>	Yes

	2) Combination of at least 2 glass thin-sections together with at least 2 individual 1-inch polished sections (resin pucks) and at least 2 individual 0.5-inch polished sections (small resin pucks)	 <p>Machined in aluminium TV1 (10 x 10 cm) part #245791 TV2 (10 x 10 cm) part #230458</p> <p>- A combination geological insert (3 x 1" pucks, 2 x ½" pucks and 3 thin sections)</p>  <p>Machined in aluminium TV1 (10 x 10 cm) part #218169 TV2 (10 x 10 cm) part #230489</p> <p>-</p> <p>The floating floor, flexible for mounting most samples including up to 6 thin sections.</p>	
D	Other		
14	Signal smoothing device capable to homogenize analyte signal with laser frequency as low as 5 Hz or lower	 <p>A mixing bulb included to increase pulse to pulse mixing and allowing measurement of samples at repetition rates down to 4Hz. The mixing bulb is a low cost and efficient mixing device with minimal contamination or carry over.</p>	Yes



		 <p>Upon request ESL can also provide the Sentinel device to further increase mixing down to repetition rates of 1Hz. This device is in development and ESL would welcome collaboration with the CAS in testing of this device.</p> <p><b>Mean Washout Time</b></p> 	
15	2 separate MFCs (= mass flow controllers) for the cell N <sub>2</sub> and He flow control (N <sub>2</sub> in mL/min or comparable range, He in L/min or comparable range)	<ul style="list-style-type: none"> <li>- 1 He MFC included as standard for chamber gas flow control</li> <li>- N<sub>2</sub> MFC for addition of N<sub>2</sub> to the sample stream for increased sensitivity.</li> <li>- Ar input port included as standard for optimal mixing with the He Aerosol.</li> <li>- N<sub>2</sub> MFC for control of beam delivery purge gas.</li> </ul>	Yes
16	PC system (including LCD monitor) fully controlling the instrument including all necessary software for data and camera images export	The imageGEO is operated via an embedded PC, controlling sample stage movement, sample viewing, gas controls, beam shaping and lasing conditions. The PC specifications are as follows, being selected to manage large data and memory requirements encountered when performing LIBS and high-speed elemental mapping.	Yes

		SuperMicro X13SAV-LVDS Motherboard 12th gen i7 (65W) processor 32GB DDR4 RAM 1 TB Samsung 980 Pro PCIE Gen4 Harddrive Windows 10 (upgradable to Windows 11).  A 24" monitor wireless keyboard and wireless mouse are also provided.	
17	Connectivity to HR ICP-MS via triggering function (including trigger cable)	A connectivity kit is provided for connection and automated analysis with the HR ICPMS. This comprises the necessary tubing, connectors, and trigger cables.	Yes

Tab. 2 – Data on the evaluation criteria

TECHNICAL PARAMETERS		
No.	Parameter	Value
1.	Stage return accuracy better than 1 micron. (YES / NO)	YES
2.	Software data processing package capable of at least: 1) data reduction of trace element analyses produced by HR ICP-MS; 2) data reduction of U-Th-Pb isotopic analyses produced by HR ICP-MS; 3) data reduction of trace element mapping analyses produced by HR ICP-MS. (YES / NO)	YES
3.	X-Y dynamic rotating aperture device that is capable of producing square and rectangle ablation craters and rasters is fully implemented into the instrument together with circle spot apertures and enables to switch between circle and X-Y dynamic rotating aperture square/rectangle ablation spots solely via SW control without need to physically intervene into the hardware of the laser system. (YES / NO)	YES
WARRANTY AND SUPPORT		
No.	Parameter	Value
1.	Technical and service support through a trained technician, who will speak Czech. (YES / NO)	NO

Annex 2: Technical description of the Equipment as presented in Seller's bid

# imageGEO193

Laser Ablation System | Geoimaging

imageGEO193



**ESL** **Elemental Scientific**  
LASERS

*Elemental Scientific Instruments***System Overview**

The imageGEO193 provides a complete workflow solution to meet the demanding needs of fast, high-resolution geological material mapping with unparalleled flexibility for traditional laser ablation analysis (low repetition rate bulk elemental or isotopic characterisation) and LIBS capability.

- A high performance and flexible sample chamber: The TwoVol2™ delivers extremely stable signals with excellent signal spatial reproducibility.
- Excellent stage return accuracy: Direct mounting and ESL's ImageLock feature ensures stage return accuracy of <1µm.
- Plug-and-play LA-ICP-MS interface: The optional DCI™ is an easy to install interface that minimizes particle dispersion on route to the ICP reducing washout for imaging applications. The design is self-aligning (relative to the MS cones) to ensure maximum ion transmission for improved sensitivity.
- A robust and stable laser source: The Coherent 500 laser at repetition rates up to 500 Hz
- Superior image quality: a 5MP camera provides the highest image resolution (<0.87 µm) and image quality of any laser ablation platform, with an optional turret mounted 20X objective for resolution down to <0.55 µm.
- Flexible spot control: Sampling resolution is provided by active spot selection; circular and rectangular spots from 1 to 150 µm in 1 µm increments (optional maximum up to 220µm with Demag device).

**imageGEO193 Reference customers:**

- Indian Institute of Science Bangalore
- British Geological Survey x 2 systems
- University of Cologne
- TU Wien
- Christian Albrechts University Kiel
- China University of Geosciences
- Eurofins EAG Materials Science, LLC
- Gemological Institute of America Inc. (GIA Secaucus)
- IGME - Instituto Geologico y Minero de Espana
- Johnson Matthey Technology
- Montanuniversität Leoben
- Netherlands Forensic Institute (NFI)
- Oak Ridge National Laboratory
- Universitat of Salzburg
- University of Maine
- Zurich Forensic Science Institute

# imageGEO193<sup>LIBS</sup>

## XYR Beam Shaping

- Square and rectangular ablations
  - Sampling matches pixels
  - Spot size = 1-240  $\mu\text{m}$

## Microscope Viewing

- Ultra-HD viewing of the sample
- < 0.55  $\mu\text{m}$  resolution
- 20X video objective (upgrade option)
- Software switchable objective

## Beam Delivery System (BDS)

- Purpose designed sealed and purged BDS with minimal number of rotational optics for lowest cost of ownership

## Imaging Mode

- Provides edge-to-edge ablation and controlled laser dosage

## Dual LIBS Connections

- Fiber optic cables for dual LIBS detection

## TwoVol3 Ablation Chamber

- Imaging Interface: Ultra-fast washout (< 1 ms – 1000 pixels/s) for high sensitivity and high imaging resolution
- Analytical Interface: Switchable cup for high precision data analysis
- Typhoon Purge: World's most efficient air removal system

## Nanograde

## High-Precision Stages

- 10 nm resolution at high speed with closed-loop feedback for perfect position recall

# imageGEO193<sup>LIBS</sup> High Frequency 193 nm Excimer Laser Source

Laser Ablation System | Geoimaging

- Water cooled, 500 Hz frequency for stable high-speed imaging
- 1000 Hz available (upgrade option) – ideal for ICP-TOF-MS integration

## LIBS


- Includes CCD and/or ICCD detector
- Adds full elemental coverage

## ICPMS

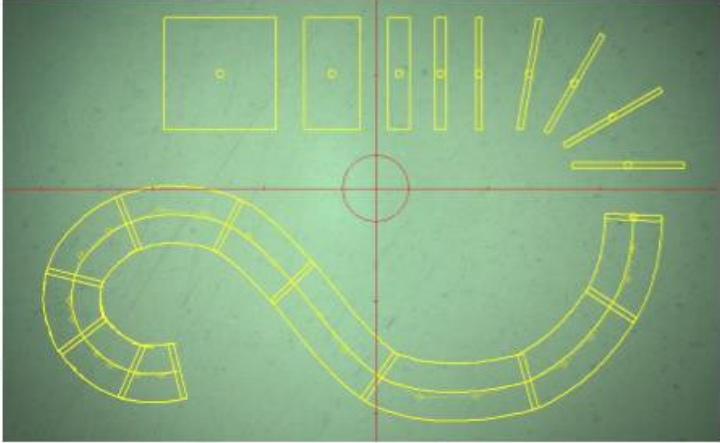
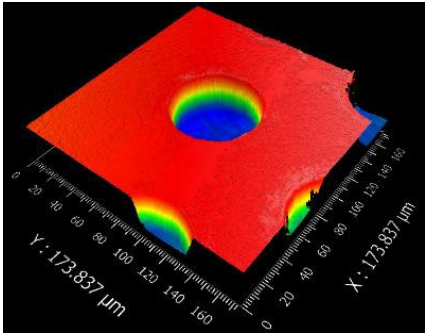
- Ablate material into a quadrupole, time-of-flight or high-resolution ICPMS

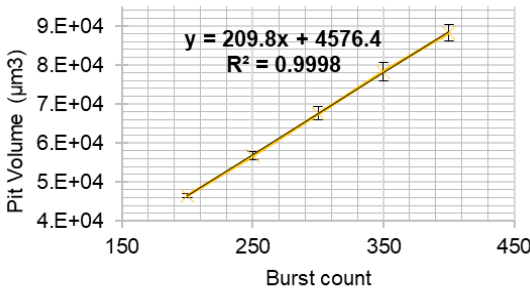
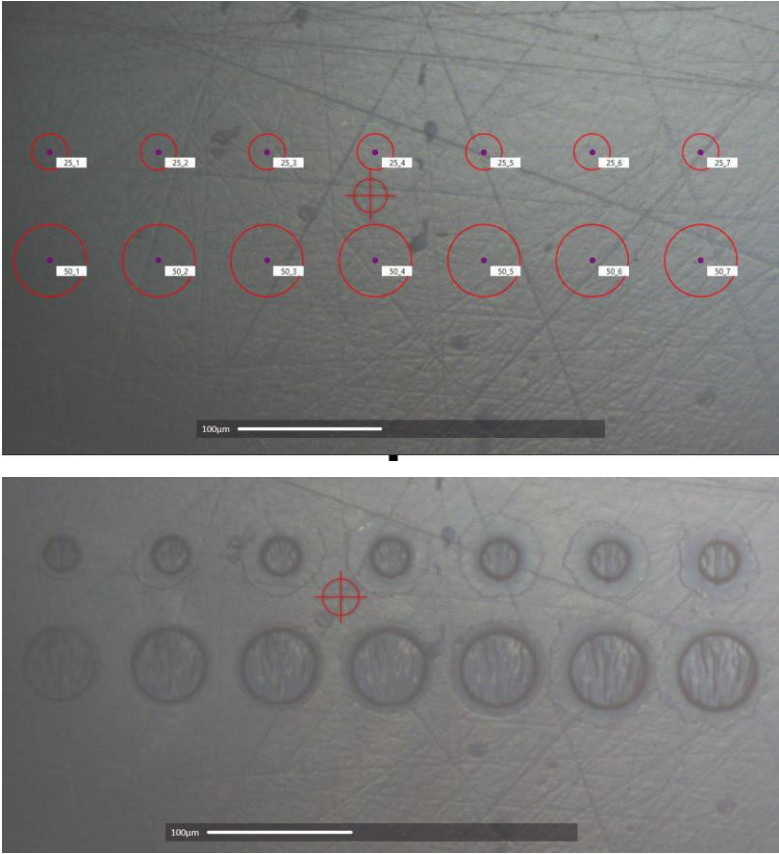
## 1. Mandatory Technical Requirements of the Laser Ablation System

### Laser System

Request	Response	Detail
<p><b><u>Laser Source</u></b></p> <p>Air-cooled ArF 193 nm laser source producing laser beam with energy fluence of at least 15 J/cm<sup>2</sup> and repetition rate in range at least 5-300 Hz.</p>	<p>Laser Source: an air-cooled ExciStar 500 ArF-excimer laser, producing a fundamental wavelength of 193nm.</p> <p>Repetition rates from 1 to 500 Hz in 1 Hz increments.</p> <p>Low amount of optics for maximum energy transmission of &gt;15 J/cm<sup>2</sup> at the sample.</p>	<p><u>ExciStar 500: a robust ArF excimer laser system</u></p> <p>The imageGEO is equipped with an air-cooled ArF excimer laser (ExciStar) from Coherent, delivering a 193 nm wavelength of 7 ns pulse width and repetition rates from 1 Hz up to 500 Hz selectable in 1 Hz increments and fluence at the sample of &gt;15 J/cm<sup>2</sup>.</p> <p>As air-cooled the laser operates with 100% duty cycle up to 300 Hz.</p> <p>The laser cavity is guaranteed for 3 billion shots (or 2 years, whichever comes first) with an expected lifetime of 4 billion shots.</p> <p>In addition to the standard mode, a software-controlled optional demagnification device (increasing spot sizes up to 220 µm) provides a secondary attenuation. The Demag can be selected in software and moved automatically by motors into the beam path. This additional attenuation provides improved resolution and thus energy control at the lower fluences down to 0.05 J/cm<sup>2</sup>.</p>
<p><b><u>Circular spots</u></b></p> <p>Circle apertures producing ablation craters at the focused sample surface of spot size in range at least 5-100 micron with max step 3 micron between 5-30 micron and then max step 10 micron between 30-100 micron spot size.</p>	<p>Spot size between 1 and 150 µm</p> <p>IVA (Patent US 859 848 8 B2) Provides circular spots, selectable in 1 µm increments (steps) across the entire range.</p>	<p><u>Flexible user selectable spot sizes in 1 µm increments from 1 to 150 µm</u></p> <p>Circular aperture imaged spots from high-resolution 1 µm to bulk analysis 150 µm using the IVA (adjustment in 1 µm increment steps, Patent US 859 848 8 B2). Flexibility to match spot size to either sample features (grain size, rim, etc.) or desired sensitivity is key in achieving good analytical results.</p>  <p><u>Increasing spot size for bulk analysis and higher mass yield (trace element)</u></p> <p>A software-controlled demagnification device (option, can be upgraded in the field later) increases the spot size to 220 µm (1 µm increment selection) for greater sensitivity of low concentration or low abundance isotopes, and higher energy resolution at low energy, key for soft materials.</p>
<p><b><u>Rectangular spots</u></b></p>	<p>XYR provides rectangular spots, selectable in 1µm</p>	<p><u>Rectangular spots adjustable in 1µm increments (XY) with dynamic rotation in 1° increments</u></p>



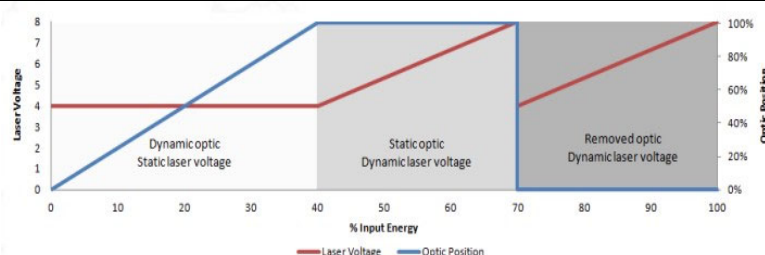
<p>X-Y dynamic rotating aperture capable of producing square and rectangle ablation craters and non-linear rasters.</p>	<p>increments in both X and Y, with dynamic rotation in 1° increments for non-linear rasters</p>	<p>Rectangular spot shapes with 1 µm step adjustment in XY and 1° step dynamic rotation across the spot range is provided by the XYR. Rectangular apertures allow growth band or diffusion tracking, whilst square apertures are useful in elemental mapping applications.</p>  <p>The IVA and XYR are housed sequentially in the beam train, with switching between the two a simple software selection (no hardware changes or opening of the optic assembly).</p>
<p><b><u>Beam Profile</u></b></p> <p>Homogenous energy across the laser beam producing flat bottom craters of the ablated material for all available spot sizes.</p>	<p>ESL's imageGEO193 utilizes a bespoke homogenizer design and aperture imaged spot shaping to provide flat and clean ablation pits across the entire spot size range (1-150µm).</p>	<p><b><u>Homogenous energy distribution and flat bottom craters</u></b></p> <p>Flat beam profiles are achieved using ESL's bespoke homogeniser (included as standard) to yield flat bottom ablation craters; a feature important to minimise downhole effects and depth profiling.</p> 

		<div data-bbox="858 237 1437 562">  <p><math>y = 209.8x + 4576.4</math> <math>R^2 = 0.9998</math></p> </div> <p>In addition to energy attenuation calibration, the spot size energy of the imageGEO is also calibrated, such that switching between spots yields the same fluence at the sample surface. As depicted below for both a 25 µm and 50 µm spot at fluences from 1 to 7 J/cm<sup>2</sup> (increasing in 1 J/cm<sup>2</sup> increments, left to right), the energy in the crater is constant regardless of spot size. The spot size remains constant, however, increasing energy above non-optimum results in liberation of large particles (and their redeposition) as well as observable melt effects.</p> <div data-bbox="756 880 1538 1731">  </div>
<p><b>Energy Attenuation</b></p> <p>Device for laser energy attenuation producing laser beam with energy output in range of at least 10-100% of</p>	<p>ImageGEO193 includes a bespoke attenuation optic for controlling laser energy delivered to the sample. Used in</p>	<p><b>Fluence Control and Energy Output</b></p>



the incoming energy with max. 5% incremental steps.

conjunction with laser source energy provides energy control from 0 to 100% in 0.1% increments.



The imageGEO is operated between 4 mJ and 8 mJ with and without attenuator in 3 modes, retaining pulse stability (<2%RSD) whilst providing high resolution energy control to yield fluence at the sample from 0.1 to >15 J/cm<sup>2</sup>. The operation between all 3 modes is seamless within the ActiveView2 control software and allows users to confidently operate across the entire fluence range whilst retaining stability.

At low fluence high-resolution energy control is achieved using a bespoke angular attenuator optic with 1000 position selection whilst the laser voltage is held at 4mJ. For mid fluence requirements the attenuation optic is held in place whilst the laser voltage is dynamically altered. For highest fluence requirements the attenuator optic is removed from the beam path and the laser voltage dynamically altered.

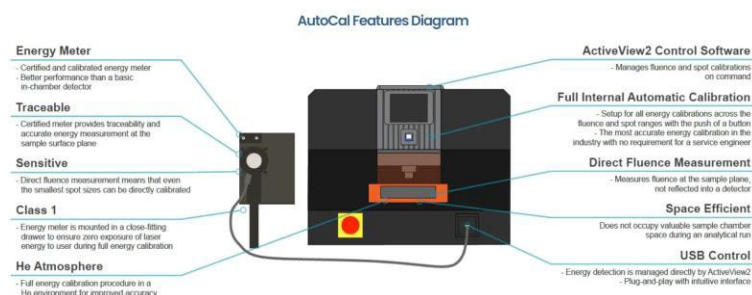
### Energy Measurement at the Sample

Energy meter/device capable of monitoring/measuring the energy of laser beam inside the cell at the same position where the sample surface is at normal circumstances.

ESL's CaliDrawer uses an energy meter positioned at the same position as the sample surface to measure and calibrate fluence. The CaliDrawer is the only system to offer actual measurement by the user at the sample surface, in a helium environment for the most accurate energy measurement, whilst retaining Class1 operation.

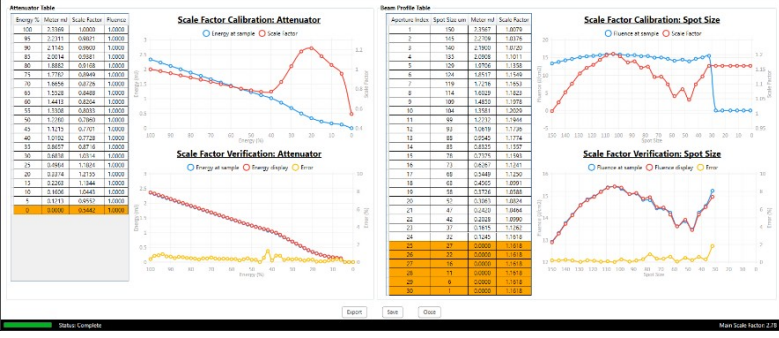
### AutoCal and Cali Drawer

The CaliDrawer is the only user operated system to measure energy directly at the sample surface with a traceable and certified energy meter in a helium environment whilst retaining Class1 operation. This is key to ensure measurement traceability and monitor system health. The energy meter is centred within a bespoke insert and the height matched to typical sample height (relative to the laser focal point). Unlike other systems that use meters outside of and below the chamber (suffering from laser divergence or optical interference), the CaliDrawer ensures energy measurement is accurate at the same point as the sample and conducted in the same environment as a sample i.e. helium filled.

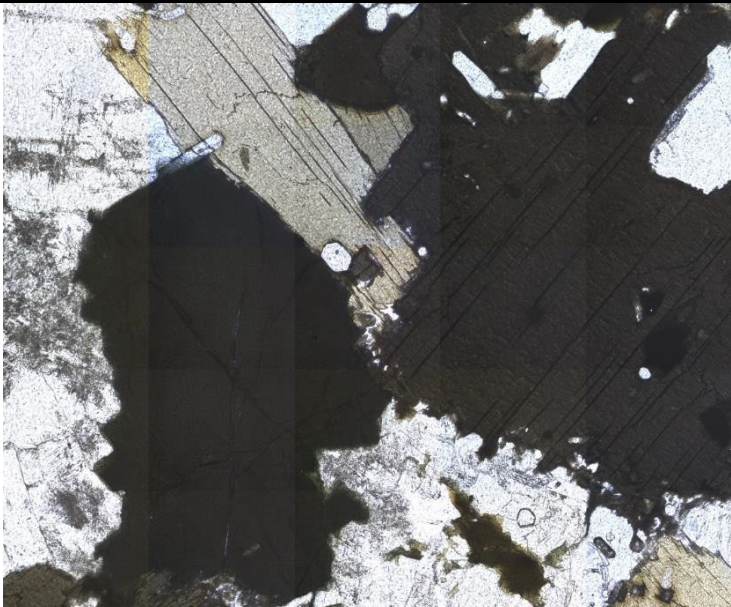


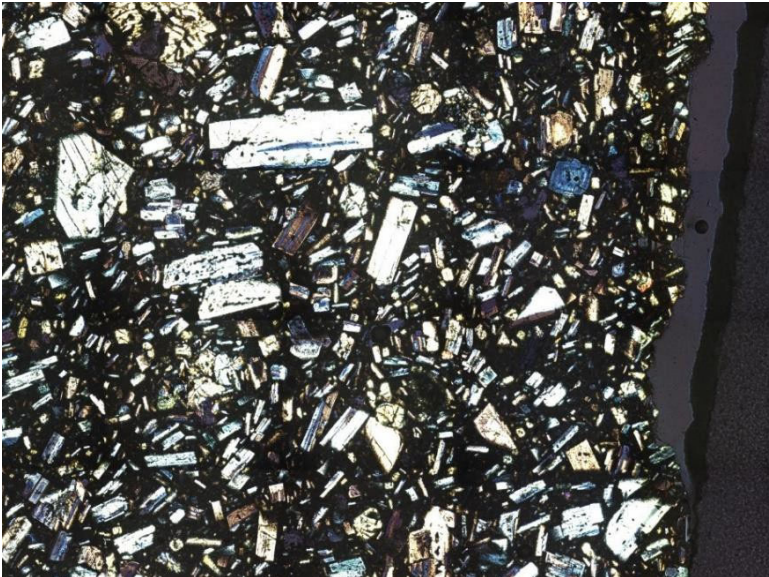
The simple one-button click AutoCal, uses the CaliDrawer to allow provide users with automatic calibration of an energy detector for live fluence readings during ablation of samples.

Operators insert the CaliDrawer and click Energy Calibration, the system automatically detects the energy meter. A simple energy attenuation calibration can then be performed, along with a more

		<p>advanced beam profile calibration to ensure reproducible fluence across the entire spot size range. Automatic reporting of the calibration allows users to track system health, identifying any patterns and alerting ESL service before failures occur, resulting in reduced downtime.</p> 															
<p><b>Power</b></p> <p>Power supply 220–240V (AC); 50/60 Hz.</p>		<table border="1"> <thead> <tr> <th>Device</th><th>Input*</th><th>Power (kW)</th></tr> </thead> <tbody> <tr> <td>Excimer Laser</td><td>230 +/-10% VAC, 6.3 A, 50/60 Hz</td><td>1.32</td></tr> <tr> <td>Ablation Platform</td><td>110/240 VAC, 6/3 A, 50/60 Hz</td><td>0.66</td></tr> <tr> <td>Monitor (LCD)</td><td>110/240 VAC, 1/5 A, 50/60 Hz</td><td>~0.10</td></tr> <tr> <td><b>Total</b></td><td></td><td>~2.00</td></tr> </tbody> </table>	Device	Input*	Power (kW)	Excimer Laser	230 +/-10% VAC, 6.3 A, 50/60 Hz	1.32	Ablation Platform	110/240 VAC, 6/3 A, 50/60 Hz	0.66	Monitor (LCD)	110/240 VAC, 1/5 A, 50/60 Hz	~0.10	<b>Total</b>		~2.00
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Monitor (LCD)	110/240 VAC, 1/5 A, 50/60 Hz	~0.10															
<b>Total</b>		~2.00															

## Imaging


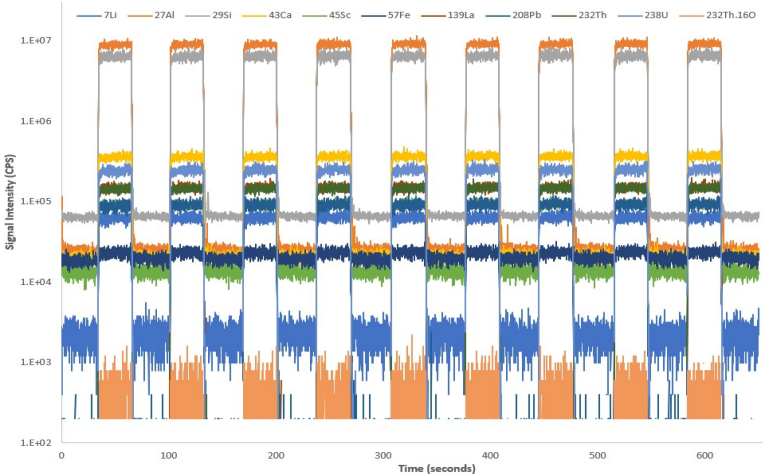
Request	Response	Detail
<p>At least HD quality of camera with resolution at least 3.5 MPx, with coaxial, ring and transmitted lighting at the sample surface</p>	<p>The imageGEO193 is configured with an ultra-HD 5MP microscope camera, coaxially aligned to the laser beam.</p> <p>Additionally, an off-axis wide angle camera with 25 mm field of view is used for navigation (TwoVol2 only).</p> <p>Combined magnification between 2.5 and 60 times.</p> <p>High intensity LED lighting:</p> <ul style="list-style-type: none"> <li>- Reflected <ul style="list-style-type: none"> <li>o Coaxial</li> <li>o Ring/flood.</li> </ul> </li> <li>- Transmitted</li> </ul>	 <p>The ImageGEO193™ utilises a 5 MP camera, microscope assembly and 8x objective to provide an optical resolution of &lt;2 µm (based on the USAF1951 standardised test) and a field of view of 800µm and 180µm at 0% and 100% digital zoom respectively.</p>

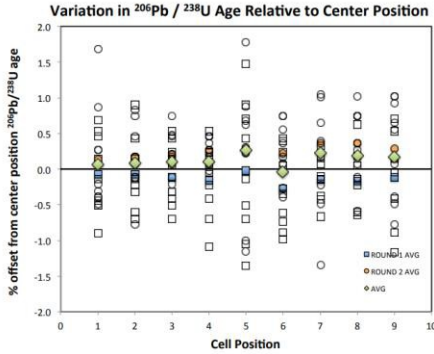
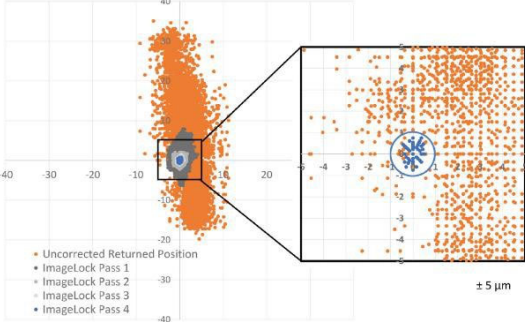
	<p>All lighting is independently optimisable in software.</p>	<p>Coaxial alignment of the camera to the laser ensures that if the video is in focus the laser will also be in focus, greatly improving the focus reproducibility and thus data quality.</p> <p><u>Secondary, off-axis wide-angle camera for navigation</u></p> <p>An off-axis wide angle colour digital camera provides a 25 mm FOV for macro sample navigation (1.3" CCD. Resolution of 640 X 480 pixels). In combination with the high-resolution microscope camera, the two are overlaid in ActiveView2 and yield a magnification between 2.5 and 60 times.</p> <p>Both the microscope camera and the wide-angle camera can be used to build sample maps; stitched mosaics built using single frames from the camera and stage movement. These images provide images for targeting and navigation. The images can be exported and then overlaid within Iolite4 on elemental maps to provide optical information.</p> <p><u>High intensity lighting for clear sample viewing</u></p> <p>Independently optimisable high-intensity LED lighting via coaxial, ring and transmitted light; in combination with high-resolution camera and optimised light gathering microscope provides the sharpest images of any laser ablation system.</p>
Optical polarizer	<p>Dual cross polarisers are provided as standard.</p>	<p><u>Dual cross polarizers</u></p> <p>Used in conjunction with the transmitted light, the dual cross polarizers provide users with the capability to optimise sample viewing for different mineral phases.</p> 


### Stage and Sample Holders


Request	Response	Detail
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<p>Two-volume cell with large cell for accommodation of multiple sample insert (sample holder) and small volume cell for laser ablation with efficient aerosole collection and transport</p>	<p>TwoVol2 comprises a large outer chamber for samples and a smaller inner cup for efficient aerosol collection.</p> <p>Stage XY: 100 x 100 mm</p> <p>Objective/focus: 50 mm</p> <p>Note, as an option the CAS may chose to upgrade from the standard TwoVol2 to either of the options below at an additional cost of \$20,000:</p> <ul style="list-style-type: none"> <li>• 150 x 150 mm LFC TwoVol2</li> <li>• 100 x 100 mm TwoVol3</li> </ul>	<p><u>TwoVol2: high-performance chamber design</u></p> <p>Included with the imageGEO193 is the high performance TwoVol2 laserablationchamber, a cell-within-cell design and accommodates a small volume inner sampling cup within the larger sampling area. The TwoVol2 provides a small volume sampling cup within a working volume of 100 x 100 x 20 mm (L x W x H, maximum sample size) and objective movement in Z of 50 mm. Open architecture design provides maximum stability, whilst allowing for easy access for maintenance.</p> 
<p>Signal reproducibility across the whole sample cell surface better than 5% RSD.</p>	<p>A combination of efficient aerosol capture by the inner cell, fixed inlet geometries and Typhoon purge results in a spatially related signal reproducibility of &lt;2%RSD across the entire chamber.</p>	<p><u>TwoVol2 Analytical Performance</u></p> <p>The inner cup design of the TwoVol2 and subsequent tubing provides consistent washout to 99% in 0.7s in all regions of the cell due to uniform gas flow velocities (from twin inlet diffusers) and cup positioning system. Washout can be optimised per application via simple connection of ESL transport interfaces.</p>  <p>The chamber flow characteristics, fixed inlet-outlet geometries, and Typhoon Purge™ provide uniform signal response across the entire ablation chamber, achieving &lt;2.0 %RSD spatially related signal reproducibility (independent of sample location). This stability and reproducibility are critical in ensuring optimum analytical conditions for any quantitative, mapping and isotope ratio work.</p>

		<p>Signal spatial reproducibility has been shown to greatly influence isotope measurements for geochronology, specifically if samples and standards are in different positions. Due to the uniform and highly efficient aerosol collection, the TwoVol2 has been shown to have no adverse effects on age determination.</p>  <ul style="list-style-type: none"> <li>• The average <math>^{206}\text{Pb}/^{238}\text{U}</math> Age variation (<math>n = 9</math>) is less than 1% for all chamber positions relative to the center position</li> <li>• Offsets of individual analyses relative to the center position are less than 2%.</li> </ul>
<p>Stage position return accuracy better than 3 micron</p>	<p>TwoVol2 stage step resolution: 0.16 <math>\mu\text{m}</math></p> <p>Stage precision: 1 <math>\mu\text{m}</math></p> <p>Stage long term precision: 3 <math>\mu\text{m}</math></p> <p>ImageLock stage return accuracy: &lt;1 <math>\mu\text{m}</math></p> <p>Note that TwoVol3 stage step resolution is 0.01 <math>\mu\text{m}</math> and a return accuracy of 0.1 <math>\mu\text{m}</math>.</p>	<p><u>TwoVol2 Stage Accuracy and Precision</u></p> <p>The TwoVol2 utilises high precision cross roller stages, mounted directly under the stage to avoid cantilever forces, to automate movement in both X and Y with a step resolution of 0.16<math>\mu\text{m}</math>. Precision of the stages are 1<math>\mu\text{m}</math> with a long-term return accuracy of 3 <math>\mu\text{m}</math>.</p> <p><u>ImageLock – improving stage return accuracy (&lt;1 <math>\mu\text{m}</math>)</u></p> <p>With ESL's patented ImageLock (Patent EP 297 220 1 A1) turned on, the accuracy of return to any location after any distance of stage movement is further improved to &lt; 1<math>\mu\text{m}</math> (typically around 0.3 <math>\mu\text{m}</math>).</p>  <p>Evaluation of stage return accuracyimprovement due to number of iterations of ImageLock for various positions within the chamber (Left). Table showing mean stage return accuracy error before and after implementation of ImageLock for a zircon analysis (Right)</p>

		<p>Stage return accuracy is critical in ensuring the laser samples the intended target/feature (individual grains, zircons, layer analysis, zone targeting, etc.) after long distance movement of the chamber stages when analysing hundreds/thousands of discrete samples (long analysis sessions).</p> <p>ESL's ImageLock provides a means to place a pattern at a specific location and return with confidence to the same location. This is achieved using the comparison of a screenshot taken when the pattern is placed, with that of the live view on the microscope before ablation takes place; ImageLock compares the two images and iteratively corrects the laser position.</p> <table><thead><tr><th>Spot #</th><th>Mean error before ImageLock (µm)</th><th>Mean error after ImageLock (µm)</th><th>SD of error (µm)</th></tr></thead><tbody><tr><td>001</td><td>7.45</td><td>0</td><td>0</td></tr><tr><td>005</td><td>7.11</td><td>0.19</td><td>0.32</td></tr><tr><td>008</td><td>6.71</td><td>0.37</td><td>0.36</td></tr><tr><td>015</td><td>5.77</td><td>0.37</td><td>0.36</td></tr><tr><td>016</td><td>5.83</td><td>0.19</td><td>0.32</td></tr><tr><td>017</td><td>7.04</td><td>0.31</td><td>0.29</td></tr><tr><td>022</td><td>5.52</td><td>0.29</td><td>0.29</td></tr><tr><td>024</td><td>6.77</td><td>0.31</td><td>0.29</td></tr><tr><td>040</td><td>6.93</td><td>0.26</td><td>0.33</td></tr><tr><td>053</td><td>6.93</td><td>0.29</td><td>0.37</td></tr><tr><td>057</td><td>5.77</td><td>0.23</td><td>0.29</td></tr><tr><td>062</td><td>5.52</td><td>0.15</td><td>0.26</td></tr><tr><td>078</td><td>6.00</td><td>0.38</td><td>0.26</td></tr><tr><td>079</td><td>5.78</td><td>0.59</td><td>0.28</td></tr><tr><td>088</td><td>5.63</td><td>0.15</td><td>0.26</td></tr><tr><td>091</td><td>5.60</td><td>0.07</td><td>0.20</td></tr><tr><td>098</td><td>5.73</td><td>0.19</td><td>0.32</td></tr><tr><td>Mean</td><td>6.32</td><td>0.29</td><td>0.3</td></tr></tbody></table>	Spot #	Mean error before ImageLock (µm)	Mean error after ImageLock (µm)	SD of error (µm)	001	7.45	0	0	005	7.11	0.19	0.32	008	6.71	0.37	0.36	015	5.77	0.37	0.36	016	5.83	0.19	0.32	017	7.04	0.31	0.29	022	5.52	0.29	0.29	024	6.77	0.31	0.29	040	6.93	0.26	0.33	053	6.93	0.29	0.37	057	5.77	0.23	0.29	062	5.52	0.15	0.26	078	6.00	0.38	0.26	079	5.78	0.59	0.28	088	5.63	0.15	0.26	091	5.60	0.07	0.20	098	5.73	0.19	0.32	Mean	6.32	0.29	0.3
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Sample holder(s) that allow for placing into the cell: 1) Combination of at least 6 individual 1-inch polished sections (resin pucks) together with at least 2 individual 0.5-inch polished sections (small resin pucks) 2) Combination of at least 2 glass thin-sections together with at least 2 individual 1-inch polished sections (resin pucks) and at least 2 individual 0.5-inch polished sections (small resin pucks)	3 inserts are provided: <ul style="list-style-type: none"><li>- A 9-puck holder (for 9 x 1" round mounts and 2 x ½" mounts).</li><li>- A combination geological insert (3 x 1" pucks, 2 x ½" pucks and 3 thin sections)</li></ul> <p>The floating floor, flexible for mounting most samples including up to 6 thin sections.</p>	<p><u>Sample inserts.</u></p> <p>Included in this offer is 3 inserts to accommodate all types of sample sizes and shapes encountered within analytical measurement of geology. A puck and geological sample holder provide optimised sample positioning, whilst floating floors provide flexibility to accommodate irregular shaped samples.</p> <p>1 x nine-puck holder</p> <div><ul style="list-style-type: none"><li>○</li><li>○</li></ul><p>Machined in aluminium TV1 (10 x 10 cm) part #245791 TV2 (10 x 10 cm) part #230458</p><ul style="list-style-type: none"><li>○</li></ul></div> <p>1 x geological sample holder for thin sections and pucks.</p> <ul style="list-style-type: none"><li>○ Holding three 26mm x 46mm/48mm/52mm thin sections or short biological slides (sliding rail to adjust for length)</li><li>○ Holding three 1" Mounts with Top Referencing Lip</li></ul>																																																																												

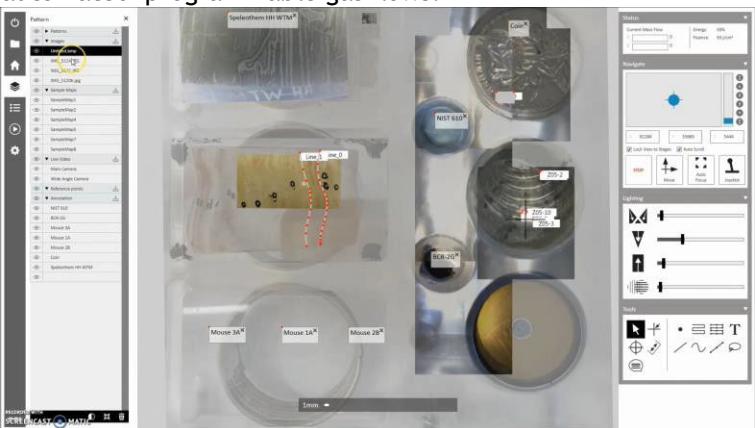
		<ul style="list-style-type: none"> <li>○ Holding two ½” Mounts with Top Referencing Lip</li> </ul>  <p>Machined in aluminium TV1 (10 x 10 cm) part #218169 TV2 (10 x 10 cm) part #230489</p> <ul style="list-style-type: none"> <li>○ 1 x floating floor – flexible sample mounting for large or irregular shaped samples.</li> <li>○ Acrylic movable sample stage – double sided:</li> </ul>
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## Other

Request	Response	Detail
Signal smoothing device capable to homogenize analyte signal with laser frequency as low as 5 Hz or lower	<p>A mixing bulb included to increase pulse to pulse mixing and allowing measurement of samples at repetition rates down to 4Hz. The mixing bulb is a low cost and efficient mixing device with minimal contamination or carry over.</p> <p>Upon request ESL can also provide the Sentinel device to further increase mixing down to repetition rates of 1Hz.</p>	<p><u>Signal smoothing device.</u></p>  <p>The imageGEO193 is provided with 1 x glass mixing bulb, to be situated between the chamber and ICP to provide signal time response smoothing, by promoting ablation plume diffusion, down to 4Hz Hz [effective chamber washout of &gt;1s]. This smoothing offers improved precision in signals via a reduction in noise (pulse to pulse variation) and is key for high precision measurement requirements (multi-element with quadrupole, Pb-U dating, Sr isotope ratios, etc.) or for thin layer analysis. Installation and training on use of smoothing devices is provided as standard.</p>





		<p>ESL offers a MFC with flow range of 0 – 10mL·min<sup>-1</sup> (accuracy of ±3% full-scale and step resolution of 1 ml·min<sup>-1</sup> [limited in software]).</p> <p><u>Beam Delivery N2 MFC</u></p> <p>The laser beam delivery system is purged via MFC controlled N<sub>2</sub> to ensure efficient removal of atmospheric gases, moisture, and laser ozone byproduct. Delivering purge gas via MFC allows for accurate control of flow rates (100 ml/min up to 5000 ml/min, typical operation 2000 ml/min) and automated control via ESL's NightManager for prescribed N<sub>2</sub> addition e.g. MFC turns off after analysis to save on N<sub>2</sub> when experiment has finished.</p>
<p>PC system (including LCD monitor) fully controlling the instrument including all necessary software for data and camera images export</p>	<p>The system is supplied with an integrated PC.</p> <p>Sample images can be easily imported into ActiveView2 via the import wizard; aligned via two reference points.</p>	<p>The imageGEO is operated via an embedded PC, controlling sample stage movement, sample viewing, gas controls, beam shaping and lasing conditions. The PC specifications are as follows, being selected to manage large data and memory requirements encountered when performing LIBS and high-speed elemental mapping.</p> <p>SuperMicro X13SAV-LVDS Motherboard 12th gen i7 (65W) processor 32GB DDR4 4 RAM 1 TB Samsung 980 Pro PCIE GenHardrive Windows 10 (upgradable to Windows 11).</p> <p>A 24" monitor wireless keyboard and wireless mouse are also provided.</p> <p>Feature rich ActiveView2 laser control software provides simple workflows e.g., bulk analysis, spots and imaging. External imagery is simple to import and align, providing macro navigation across the entire chamber, detailed information from other chemical analysis e.g., CL and means to placed patterns outside the camera field of view. Sample maps using high-resolution onboard cameras (5MP camera) are used to build detailed optical images for import into lolite4, record keeping and any subsequent elemental maps. ActiveView2 provides autofocus, automatic standard-bracketing, data collation via Chronicle (laser and ICPMS data stored together), automated/programmable gas flows.</p> 

<p>Connectivity to HR ICP-MS via triggering function (including trigger cable)</p>	<p>A connectivity kits are provided for connection and automated analysis. This comprises the necessary tubing, connectors, and trigger cables.</p>	
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The imageGEO193 platform can be configured to trigger with the ICP-MS systems for hard bi-directional communication. Triggering via either the BNC or plugin (see below) facilitates unattended measurements for full automation, and thus improved productivity. This makes the analysis of hundreds of discrete samples or imaging practical. Triggering via this method can be compatible for all quadrupole and multi-collector instruments.

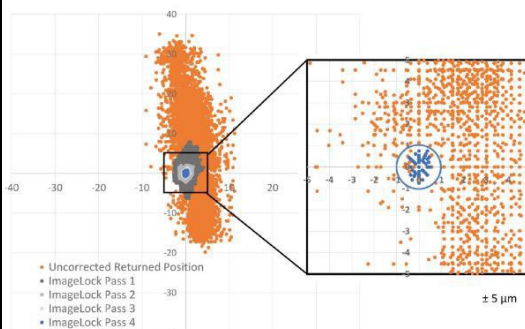
### Plugins

The screenshot shows the ICP-Q software interface. The main window is titled "Dashboard - ICP-Q with NWR193 new plug in". On the left, there is a sidebar with navigation options: Dashboard, LabBooks, Templates, LabBook Query, File Manager, System Log, and Help. The main area displays a table of laser parameters. The table has columns for "Run ID", "Pattern", "Pattern Type", "Pattern Name", "Standard", "Pulse Enabled", "Energy", "Fluorescence", "Energy Units", "Pulse Rate", "Scan Size", "Scan Speed", and "Status". The table lists various laser runs with their respective parameters. On the right side of the table, there is a "Status" column with a dropdown menu. The status panel on the left shows the "NWR Laser" status as "Connected" and "Laser Ring" as "Laser Ring".

ESL provides a plugin for Qtegra and Mass Hunter software at no additional cost. A plugin allows direct communication, triggering, and control of experimental conditions between both the laser and

		<p>the ICP-MS for automated analysis. Meta data e.g. pattern names, spot sizes, pattern duration are transferred from the laser to the ICPMS, thus ensuring data continuity.</p> <p>Plugins greatly improve the analytical workflow, as users do not need to translate information from the laser to the ICP-MS and eliminates transcription errors. The plugins provide error handling functionality not possible when using a simple trigger cable: if an error occurs with the ICP and the plasma stopped, the plugin will stop the laser from ablating, thus preserving sample material (crucial for valuable, rare, or unique samples).</p>
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## 1. Data on the Evaluation Criteria

Request	Response	Detail																																																																												
<p>Stage return accuracy better than 1 micron.</p> <p>(YES / NO)</p>	<p>Yes</p> <p>ESL's patented ImageLock provides return accuracies of around 0.3 <math>\mu\text{m}</math>.</p>	<p><u>ImageLock – improving stage return accuracy (&lt;1 <math>\mu\text{m}</math>)</u></p> <p>With ESL's patented ImageLock (Patent EP 297 220 1 A1) turned on, the accuracy of return to any location after any distance of stage movement is further improved to &lt; 1<math>\mu\text{m}</math> (typically around 0.3 <math>\mu\text{m}</math>).</p> <div></div> <p>Evaluation of stage return accuracy improvement due to number of iterations of ImageLock for various positions within the chamber (Left). Table showing mean stage return accuracy error before and after implementation of ImageLock for a zircon analysis (Right)</p> <p>Stage return accuracy is critical in ensuring the laser samples the intended target/feature (individual grains, zircons, layer analysis, zone targeting, etc.) after long distance movement of the chamber stages when analysing hundreds/thousands of discrete samples (long analysis sessions).</p> <p>ESL's ImageLock provides a means to place a pattern at a specific location and return with confidence to the same location. This is achieved using the comparison of a screenshot taken when the pattern is placed, with that of the live view on the microscope before ablation takes place; ImageLock compares the two images and iteratively corrects the laser position.</p> <table><thead><tr><th>Spot #</th><th>Mean error before ImageLock (<math>\mu\text{m}</math>)</th><th>Mean error after ImageLock (<math>\mu\text{m}</math>)</th><th>SD of error (<math>\mu\text{m}</math>)</th></tr></thead><tbody><tr><td>001</td><td>7.45</td><td>0</td><td>0</td></tr><tr><td>005</td><td>7.11</td><td>0.19</td><td>0.32</td></tr><tr><td>008</td><td>6.71</td><td>0.37</td><td>0.36</td></tr><tr><td>015</td><td>5.77</td><td>0.37</td><td>0.36</td></tr><tr><td>016</td><td>5.83</td><td>0.19</td><td>0.32</td></tr><tr><td>017</td><td>7.04</td><td>0.31</td><td>0.29</td></tr><tr><td>022</td><td>5.52</td><td>0.29</td><td>0.29</td></tr><tr><td>024</td><td>6.77</td><td>0.31</td><td>0.29</td></tr><tr><td>040</td><td>6.93</td><td>0.26</td><td>0.33</td></tr><tr><td>053</td><td>6.93</td><td>0.29</td><td>0.37</td></tr><tr><td>057</td><td>5.77</td><td>0.23</td><td>0.29</td></tr><tr><td>062</td><td>5.52</td><td>0.15</td><td>0.26</td></tr><tr><td>078</td><td>6.00</td><td>0.38</td><td>0.26</td></tr><tr><td>079</td><td>5.78</td><td>0.59</td><td>0.28</td></tr><tr><td>088</td><td>5.63</td><td>0.15</td><td>0.26</td></tr><tr><td>091</td><td>5.60</td><td>0.07</td><td>0.20</td></tr><tr><td>098</td><td>5.73</td><td>0.19</td><td>0.32</td></tr><tr><td>Mean</td><td>6.32</td><td>0.29</td><td>0.3</td></tr></tbody></table>	Spot #	Mean error before ImageLock ( $\mu\text{m}$ )	Mean error after ImageLock ( $\mu\text{m}$ )	SD of error ( $\mu\text{m}$ )	001	7.45	0	0	005	7.11	0.19	0.32	008	6.71	0.37	0.36	015	5.77	0.37	0.36	016	5.83	0.19	0.32	017	7.04	0.31	0.29	022	5.52	0.29	0.29	024	6.77	0.31	0.29	040	6.93	0.26	0.33	053	6.93	0.29	0.37	057	5.77	0.23	0.29	062	5.52	0.15	0.26	078	6.00	0.38	0.26	079	5.78	0.59	0.28	088	5.63	0.15	0.26	091	5.60	0.07	0.20	098	5.73	0.19	0.32	Mean	6.32	0.29	0.3
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<p>Software data processing package capable of at least: 1) data reduction of trace element</p>	<p>Yes</p> <p>1 lifetime license of lolite4 is provided (this allows for up to 2 installations). This is an indefinite license i.e.</p>	<p><u>Overview of lolite 4</u></p> <p>lolite4 is the most advanced laser ablation data processing software on the market with &gt;1000 users and 15+ years of experience. lolite4, now integrated within ActiveView2, easily and quickly combines ICPMS data with the laser log file of the imageGEO193 to provide automated selection of samples, standards, and background.</p>																																																																												

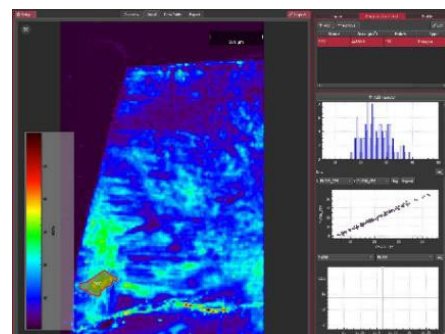
analyses produced by HR ICP-MS;  
2) data reduction of U-Th-Pb isotopic analyses produced by HR ICP-MS;  
3) data reduction of trace element mapping analyses produced by HR ICP-MS. (YES / NO)

does not require annual renewal. This is limited to Iolite4 and up to 3 years of technical support. Updates are provided free for the lifetime of the product.

Signals and selections, inspected by the user, are passed through one of the many in-built DRS including the new 3D trace elements, a multi-point calibration approach that provides a time dependent sensitivity surface for calibration. Quantified data can be interrogated, and statistics propagated such as uncertainty, means, ratios or and LODs for automatic reporting.

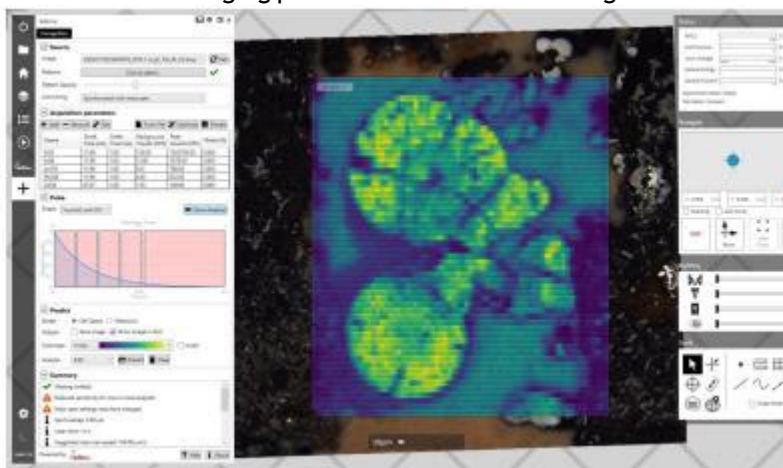
#### Elemental maps

Inclusion of the pattern names, XY data, translation rate, spot spacing and spot size, from the laser log file provides accurate quantified-elemental maps with correct scaling. Areas can be inspected using the wide variety of Iolite4's tools on ROI's or transects (profile) to extract regional-concentration data, elemental histograms, isotope or elemental associations and many other statistical tools. External images, such as sample maps from the laser software, can be overlaid on the elemental maps, providing structural and elemental visualisation in a single image.



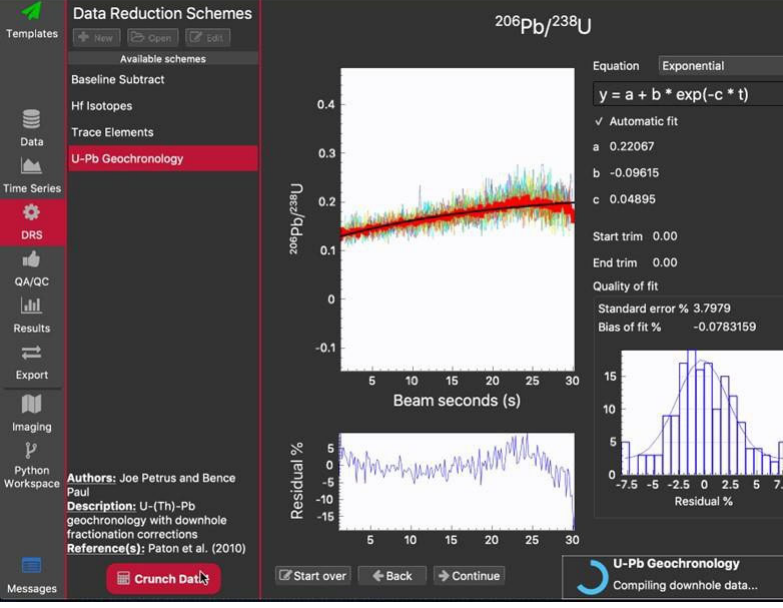
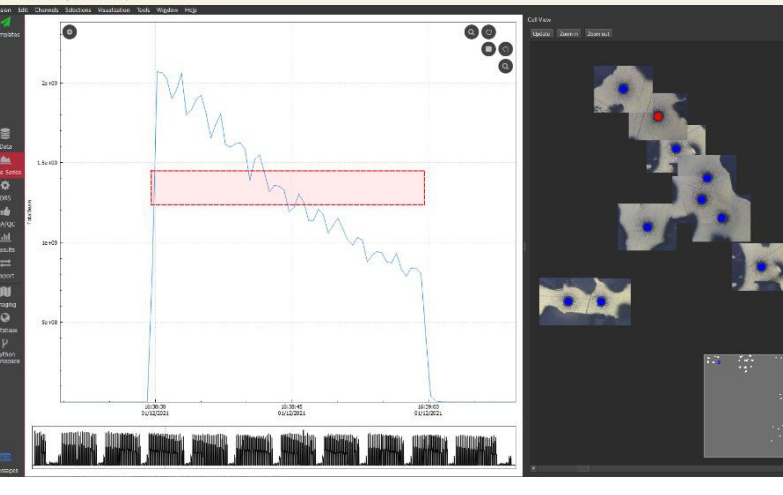
#### Precognition – image prediction and optimisation

Iolite 4 is also the engine behind precognition, an ActiveView2 add-in that utilises the optical camera image and combined laser-mass spectrometer settings to predict what elemental maps will look like. Precognition calculates and suggests optimised mapping settings to avoid aliasing and provides users the ability to observe the effects of changing parameters on the final image.



#### Geochronology

Iolite 4 is widely used for geochronological laser ablation data reduction. Built in and open access data reduction schemes such as U/Pb, Hf isotopes and in-situ Rb/Sr provide fast and robust age calculations. Iolite4 also provides uncertainty propagation, Concordia plotting and downhole fraction correction.

		 <p>CellView: Import laser experiment files directly into Iolite, linking pattern information and geometric position with ICPMS data and optical images (pre and post ablation). Quickly inspect irregular or problematic data, locate spot position within the chamber and visualise the ablation crater for defects/issues.</p> 
<p>X-Y dynamic rotating aperture device that is capable of producing square and rectangle ablation craters and rasters is fully implemented into the instrument together with circle spot apertures and</p>	<p>Yes The imageGEO is the only system to provide a combination of circular and rectangular spots with 1 µm incremental size selection across the entire range all from within software control (i.e. no need to swap hardware).</p>	<p><u>Flexible user selectable spot sizes in 1 µm increments</u></p> <p>Circular aperture imaged spots from high-resolution 1 µm to bulk analysis 150 µm using the IVA (adjustment in 1 µm increment steps, Patent US 859 848 B2). Flexibility to match spot size to either sample features (grain size, rim, etc.) or desired sensitivity is key in achieving good analytical results.</p> <p>Rectangular spot shapes with 1 µm step adjustment in XY and 1° step dynamic rotation across the spot range is provided by the XYR. Rectangular apertures allow growth band or diffusion tracking, whilst square apertures are useful in elemental mapping applications.</p>



<p>enables to switch between circle and X-Y dynamic rotating aperture square/rectangle ablation spots solely via SW control without need to physically intervene into the hardware of the laser system.</p> <p>(YES / NO)</p>		<p>The IVA and XYR are housed sequentially in the beam train, with switching between the two a simple software selection (no hardware changes or opening of the optic assembly).</p> <p><u>Increasing spot size for bulk analysis and higher mass yield (trace element)</u></p> <p>A software-controlled demagnification device (option) increases the spot size to 220 µm (1 µm increment selection) for greater sensitivity of low concentration or low abundance isotopes, and higher energy resolution at low energy, key for soft materials.</p>
<p>Technical and service support through a trained technician, who will speak Czech.</p> <p>(YES / NO)</p>	<p>No</p> <p>ESL offers to cover travel and accommodation costs of a CAS technician to the UK global service centre to be trained in how to fully service the imageGEO193 (duration of 5 days).</p>	<p>ESL propose covering travel costs and accommodation of a technician from the CAS to join the service group at the global service centre in the UK, to be trained in all servicing aspects of the imageGEO193. The offer would be for 5 days of hands-on training with an equivalent instrument in ESL's service/demo lab.</p> <p>ESL has 4 European service engineers dedicated to only the maintenance and servicing of its lasers. This is the largest number of service personnel in Europe of any laser ablation manufacturer. All ESL's service group are high trained and experienced; using dedicated laser service engineers provides the most optimum support for customers. In ESL's experience, using local reps or distributors to service instruments does not work as the frequency with which they undertake tasks or servicing means that core skills are lost resulting in poorer service and longer down times for customers.</p> <p>The global service support centre is based in the UK (holding the largest global stock of laser spare parts), with additional sites in Strasbourg (France) and Germany (Mainz). Spare parts are typically supplied next day upon receiving request / purchase orders (outside of warranty or contracts).</p>



## Annex 3

Affidavit according to § 6 paragraph 4 of the Act No. 134/2016 Coll.

## Affidavit

Public Contract name:	HR ICP-MS with Excimer laser
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### Bidder / Supplier

Registered company name / Trade name / Name:	Elemental Scientific Instruments France
Registered Office:	route de la Wantzenau 23, 67800 Hoenheim, France
(Company) Identification No.:	824813323

The Supplier of the above-mentioned Public Contract undertakes to:

- a) ensure compliance with all labour law regulations (concerning remuneration, working hours, rest periods between shifts, paid overtime), as well as regulations concerning employment and safety and health protection for the entire duration of the contractual relationship established on the basis of this Public Contract, to all persons involved in the performance of the contract (regardless of whether the activities will be performed by the Supplier himself or his subcontractors) and
- b) ensure compliance with legal regulations in the field of environmental law, which meets the objectives of environmental policy related to climate change, use of resources and sustainable consumption and production. The Supplier must therefore take all measures that can reasonably be required of him to protect the environment and reduce the damage caused by pollution, noise and other activities, and must ensure that emissions, soil pollution and waste water from his activities do not exceed the values laid down in the relevant legislation.

At the same time, the Supplier acknowledges that a breach of the above obligations may be a reason for the Contracting Authority to withdraw from the contract in accordance with its relevant provisions.

Signature of the person authorized to represent the Bidder/Supplier:	
Place:	Hoenheim
First name, Surname, Position in the company:	VISCARDI Aurélien, Managing Director
Signature:	