L E A
Laser Elemental Analyzer
The LEA is a hand-held analyzer which uses a low power laser beam to provide instant, on-site, elemental fingerprinting of materials.

The laser generates a plasma from a microscopic amount of the sample and the light released indicates the elemental composition.

Measurements take approximately 1 second. The data can be displayed on the screen and compared with built-in references for identification. Data stored on the removable USB drive can then be sent for further analysis.

Unlike XRF, all elements, light and heavy, can be identified with the LEA. And unlike arc-spark devices, both conducting and non-conducting samples can be measured. In addition, all sizes of solid samples can be measured - from trace amounts of powder to large structures.

Operation

The only button on the LEA is the trigger which is used to power-up the instrument and fire the laser. After switching on, a safety key-code must be entered by the user and there is a short warm-up time before the laser will fire.

The nose of the LEA must be brought in contact with the sample and the trigger held until the result is displayed. All other operations are simple 'Icon-Driven' applications which can be selected on the large, touch-screen, color display directly facing the user.

Material reference files are stored in the LEA to allow instant identification of field samples. Spectral data from unknown samples can be downloaded for further analysis. Communications include Bluetooth, a removable flash drive and a remote safety interlock. Power is from a rechargeable battery pack which will provide up to 1000 measurements from full charge. Battery packs can be quickly swapped to maintain operation.
The LEA can be used to test large or small samples including powders and uneven surfaces.

The LEA is a ‘surface analyzer’ so test pieces should be clean but no specific sample preparation is normally needed.

- Rapid measurement time - about 1 second
- Simple point and shoot operation
- Nearly any solid material can be analyzed
- Any sample size or type

**Operator Safety**

The LEA has been assessed to be a Class 3B laser device and should be handled accordingly.

Although the beam produces a very high intensity at the sample it diverges rapidly and is harmless provided the beam is not aimed directly into the eye from a short distance (NOHD ~20 cm).

The LEA laser will not penetrate the human body and is non-ionizing. Laser light is considered non-carcinogenic. There is no need for operator certification or licencing.

*Spectral data from a pill*
Laser Induced Breakdown Spectroscopy (LIBS) can be considered a 'virtually' non-destructive technique – less than 1 billionth of a gram of material is consumed during a typical test.

Laser pulses generate a high temperature micro-plasma on the surface of the material. Microscopic particles are exploded from the surface into the plasma where they are atomised and energised. After this excitation, light that is characteristic of the elemental composition of the material is emitted and analyzed within the optical spectrometer.

The laser has low average power but is focused to a microscopic point on the sample to generate the plasma. This causes virtually no sample heating.

The laser diode and analytical optics are both heated. The system requires a short warm-up period for the laser to become operational. Analytical performance will gradually improve as the temperature of the optics stabilizes.

The LiFeP explosion proof battery pack will permit up to 1000 analyses from full charge. The battery can be recharged using the standard ‘Fast-Charger’ within 2 hours. The LEA can also be operated from mains via the charger.
Appendix - example spectra

Aluminum alloy

Be - Cu Alloy

Brass
Appendix - example spectra

Indium

Lead

Stainless steel
Appendix - example spectra

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\text{\( \alpha\)-BaB}_2\text{O}_4
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\text{BiB}_3\text{O}_6
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\text{KTiOPO}_4
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