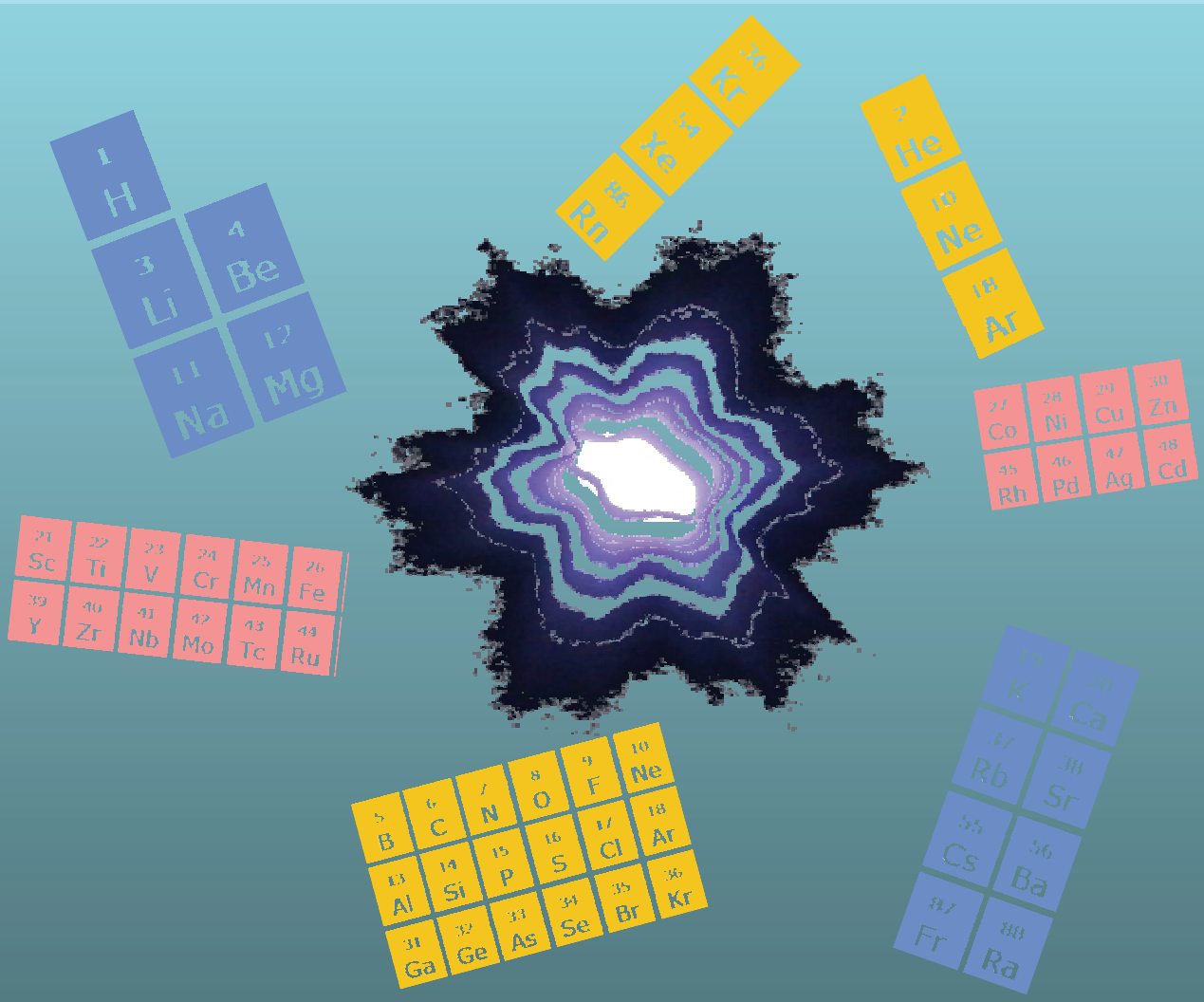
Insight™ LIBS Elemental Analysis

Laser-Induced Breakdown Spectroscopy for Microanalysis

Simple, sensitive, repeatable material identification



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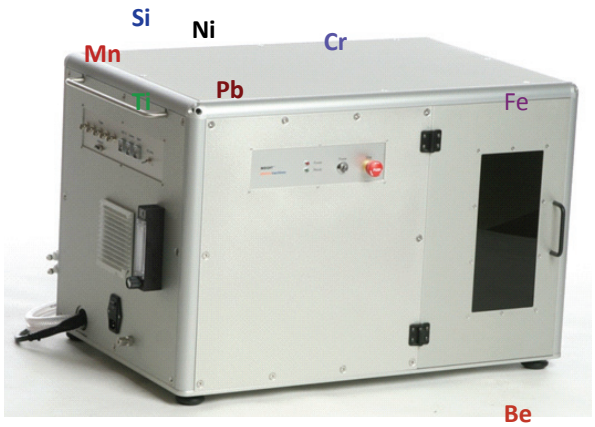
Making Light Work™

Insight™ LIBS Elemental Analysis

Laser-Induced Breakdown Spectroscopy



High-sensitivity microanalysis made simple

- Small spot size (3-5 microns)
- Stable and repeatable
- Broadband simultaneous measurement of many elements
- Excellent resolution

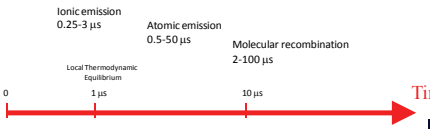
Ca
Cd
Na
Mg
Zn

What is LIBS?

The Insight™ LIBS analysis system uses a short-wavelength Nd:YAG laser to efficiently ablate a sample and form an air plasma above the sample to interrogate the resulting nanoparticles. Spectra are recorded and analyzed using a high-sensitivity, broadband spectrometer.

Laser Ablation by Nd:YAG
removes ~ 50 nm of material from solid sample in a controllable spot

1



Plume Expansion and Equilibration
The laser ablation plume expands and the kernel of the laser plasma reaches thermodynamic equilibrium

2

Measurement in Analytical Plasma
Intensified camera measures spectrum during specified emission window to determine composition of plume

3

LIBS™ Analysis

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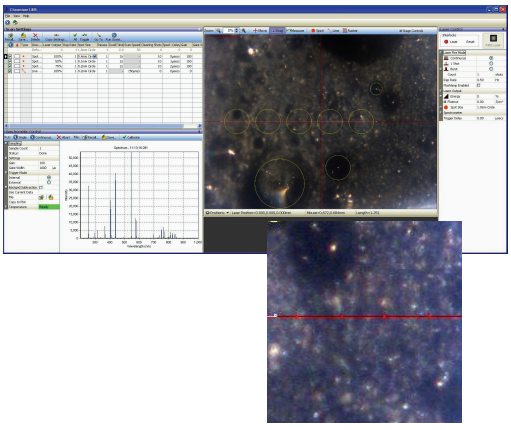
High magnification camera allows sample visualization

See your sample and the 3-5 micron ablation spots in the high-resolution camera



FEATURING:

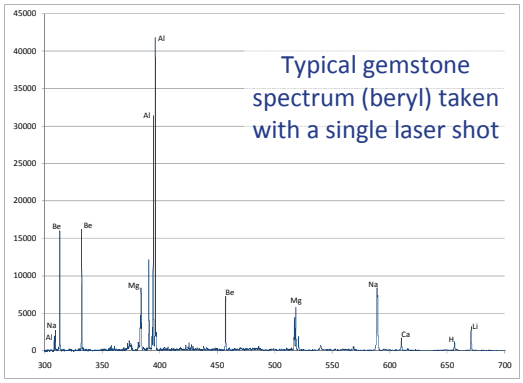
- Configurations with 266 or 1064 nm Nd:YAG ablation / LIBS lasers
- Convenient sample-holding stage
- Confocal video imaging for target / crater and focal plane visualization
- High-magnification camera with coaxial viewing
- Class 1 laser enclosure
- Enclosure purge with control
- On-board laser and spectrometer timing control (± 10 ns internal)
- Intuitive control software

Insight™ Advantages

Simple and sensitive elemental analysis with no sample preparation

SIMPLE: The Insight™ LIBS is designed from the ground-up for microanalysis of solid materials. Open the Class-1 laser safety enclosure and place your sample on the stage. Manually bring the sample into video focus, and close the door. You can visualize the targeted area using the on-board video, and move around the sample in real-time using the computer-controlled x/y stages. Program a single point, a line of points, an array of points, or a set of arbitrary points to analyze. Press "Go". The Insight™ system does the rest, moving the sample, firing the laser, controlling spectrometer, and displaying spectra in real-time.

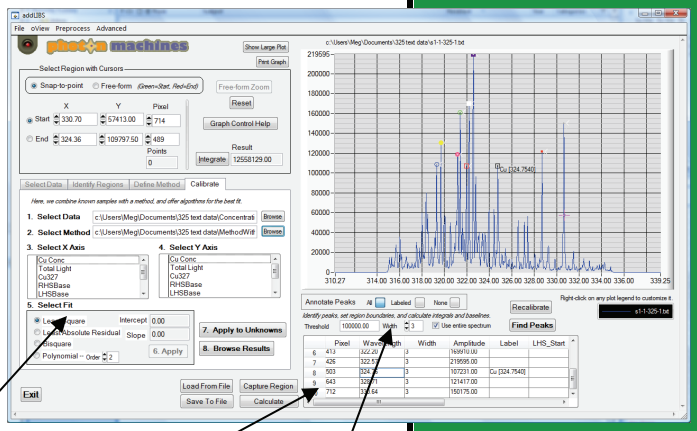
SENSITIVE: The Ocean Optics broadband spectrometer installed in the Insight™ provides a broad (190-800+ nm typical) spectral range with excellent resolution throughout the spectrum. The figure at left illustrates a portion of a single-shot LIBS spectrum of a gemstone. Major and minor elements can be resolved, and the 14,000+ points in a typical spectrum can be expanded to reveal lines separated by less than 0.5 nm in the UV range. Overall, the broadband spectrometer used in the Insight™ allows excellent sensitivity to low light levels at an affordable price point.



ANALYSIS: The addLIBS™ software which accompanies the Insight™ is designed to make plasma emission spectroscopy analysis easy. addLIBS allows users to explore spectra using partial NIST or in-house spectral libraries, annotate spectra, develop calibration methods using known samples, and apply calibrations manually or automatically to unknown spectra. Once a method is developed it can be repeatedly applied without further analysis, or it can be modified at will. Standard linear and multiple linear regression fits can be used to model the data, as well as polynomial fits.

For more complicated data, chemometric methods such as PLS are being implemented, and data can also be exported to standard analysis software such as GRAMS™ or Excel™. Spectra are automatically ported from the instrument control software to addLIBS™ as they are acquired.

Fast Answers!



Build unique, repeatable methods

Identify and tabulate peaks

Spectral View

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GRAMS™ is a trademark of Thermo Fisher Scientific, and Excel™ is a trademark of the Microsoft Corporation.

Insight™ System Operation and Specs

September, 2010

BUILT FOR HIGH-FIDELITY MEASUREMENTS

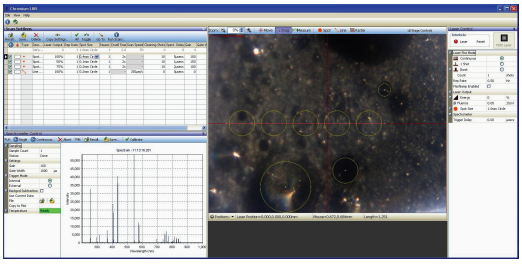
- Rugged Nd:YAG laser, broadband spectrometer
- Built-in timing control circuit synchronizes laser and spectrometer
- Confocal video and laser planes ensure measurement repeatability
- Overall timing jitter with respect to external synch signal <= 10 ns
- Purged sample chamber
- Rotometer-regulated flexible "assist" gas nozzle for N_2, He, or Ar
- Class 1 safety enclosure

CONFIGURABLE

- Adjustable, coaxial lighting of sample
- Variable laser energy
- Variable spectrometer delay
- Software-selectable spot size from sub-5 µm to 2 mm (FWHM)

POWERFUL, EASY TO USE

- Sample interrogation and analysis software tools
- Laser energy measurement and display
- User-selectable repetition rate
- User-selectable spot size of the laser beam via software control
- Single-shot, burst and continuous firing modes
- Complete programming of parameters and repeatable methods
- Color video microscope displays live sample images
- Computer connection: USB 2.0, OS: Windows XP or Windows 7
- Computer-controlled x/y/z stage for sample targeting



Intuitive Software: The Insight™ comes with computer-based visualization software that controls the laser pulse energy, aims the laser spot, and controls the laser spot size. The software controls all important functions of the spectrometer and the laser, such as calibration, and manages the laser and spectrometer timing. Repeatable patterns can be measured on subsequent samples. Spectra are immediately displayed following acquisition.

THE COMPANY

The people of Photon Machines are proven industry innovators with decades of experience in LIBS, laser ablation for noble gas, isotope ratio and ICP-MS, and ICP-OES. Novel designs, quality manufacturing and skilled service support make Photon Machines a qualified and dependable supplier.

OPTIONS

Insight™ systems are configurable with many options, including choice of laser wavelength and energy, and spectrometer characteristics. Please call Photon Machines today to discuss your application.

The Product of Experience™

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High-fidelity measurements with no sample preparation!

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