


iolite: Laser Ablation Imaging and Data Processing The Most Comprehensive LA-ICPMS Software Package Available

**iolite**
An Elemental Scientific Company

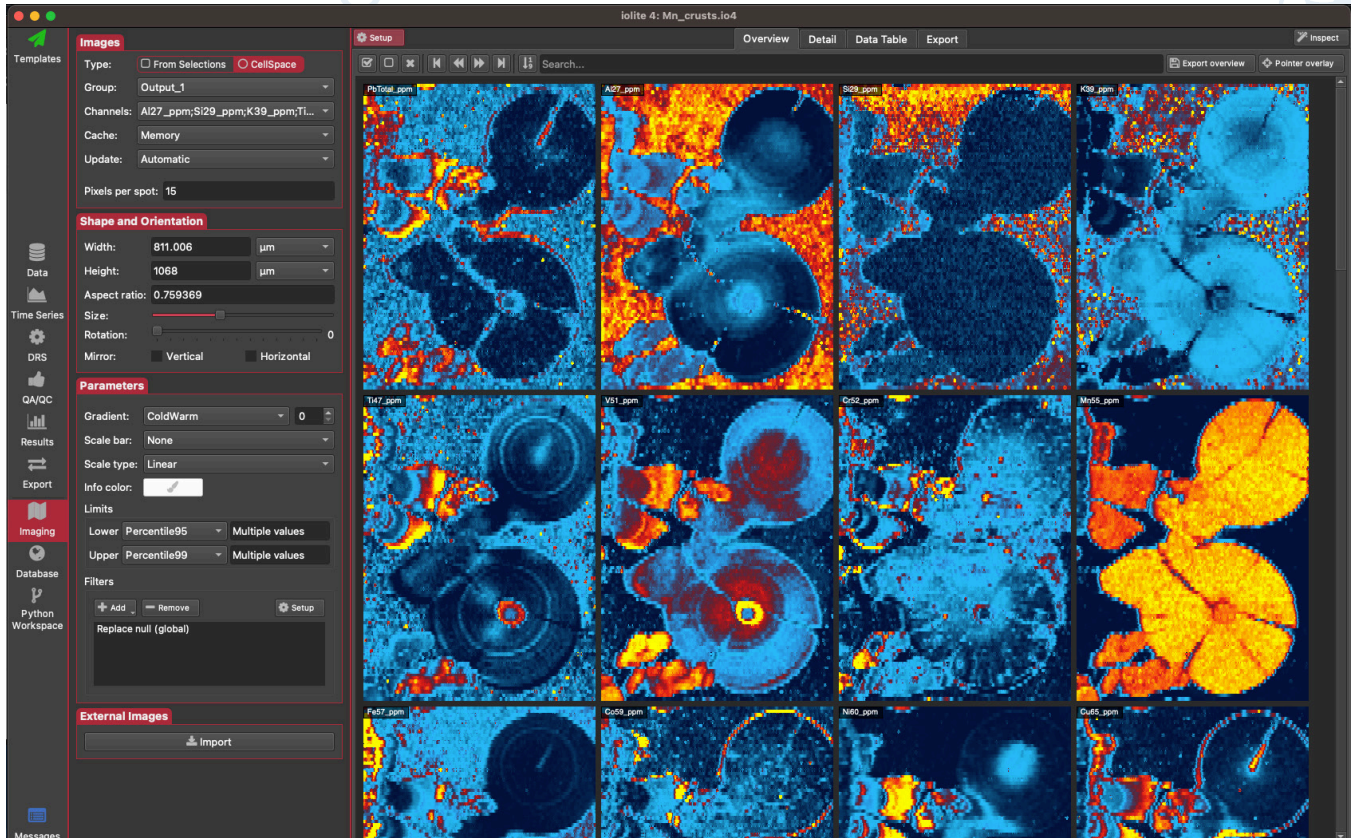
Capabilities

Capabilities

Leading the way in data processing and visualization, iolite is the only laser ablation software which can perform calculation tasks ranging from trace element experiments through to imaging, geochronology and isotopic systems (e.g. Sr, Hf isotopes), with extensive capabilities for:

- Trace elemental calculations
- U-Pb geochronology
- Imaging
- LIBS data processing
- Automation
- Customization

In short, iolite is the one data software package that does it all. Connect to the largest community of LA-ICPMS users – hundreds of labs around the world, including commercial labs, R&D departments, government agencies, and academic researchers. Their contributions have led to 15+ years of development and provided direction for extending the software's capabilities.



iolite provides a variety of processing options for a range of sample types. Shown here are fully quantified concentration maps for a deep-sea manganese nodule.

Trace Elemental Calculations

A range of options for the best results possible

With a variety of trace element calculation options, including semi-quantitative (ideal for imaging), internal standardization, sum-normalization and multi-calibrant approaches, iolite has the right approach for any application.

- New 3D Trace Elements package uniquely offers 3D calibration surfaces for time-resolved calibration curves with additional accuracy and precision
- Multiple options for limits of detection calculations (LODs)
- Adjustable cubic splines, to model backgrounds and changes in instrument sensitivity, provide the best possible accuracy and precision.

The screenshot displays the iolite software interface for the 3D Trace Elements Data Reduction Scheme. The interface is organized into several key sections:

- Left Sidebar:** Contains navigation options such as Templates, Data, Time Series, DRS (highlighted), QA/QC, Results, Export, Imaging, Database, and Python Workspace.
- Data Reduction Schemes:** A list of available schemes, with '3D Trace Elements' selected.
- External standards:** A table listing external standards for various elements. The table includes columns for Channel, External standards, Model, Zero, and Frac. correction. Elements listed include Li7, Be9, B11, Na23, and Mg24.
- Use internal standards:** A table listing internal standards for various elements. The table includes columns for Element, Value, Units, Affinity, Import IS values, Edit criteria, and Filter... Elements listed include G_BCR2G and G_BHVO2G.
- 3D Trace Elements Plot:** A 3D plot showing a surface representing intensity as a function of time and concentration. The axes are labeled Intensity, Time, and Concentration. The surface is colored with a gradient from blue to red.
- Bottom Status Bar:** Displays 'Channel Li7', 'Method Laser log', and 'Affinity correction'.

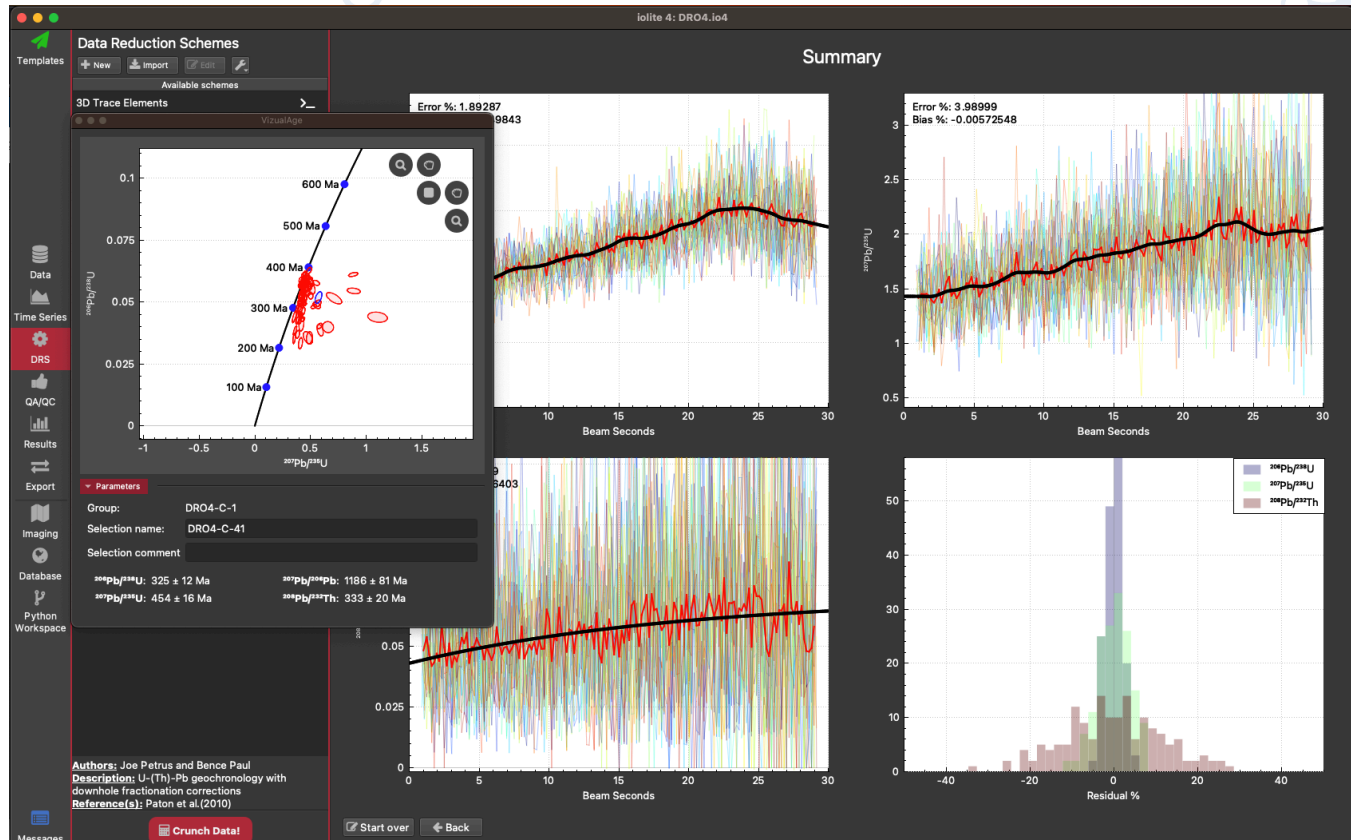
The new 3D Trace Elements Data Reduction Scheme models sensitivity through time as a 3D surface to provide the best possible accuracy.

U-Pb Geochronology

Market Leaders

Leading the way in LA-ICPMS U-Pb geochronology, *iolite* is the industry-preferred solution with its fast and easy to use interface. It provides the analyst with choice and flexibility, including a range of down-hole fit options and visualization tools.

- Proven U-Pb geochronology approach, with the original publication describing *iolite*'s unique approach gathering more 1,100 citations.
- Expand U-Pb dating targets to common-Pb bearing minerals such as apatite, titanite and more with UCPb designed especially for common-Pb bearing minerals.
- Wetherill and Tera-Wasserburg plots allow the analyst to see how their edits affect the concordance of their results in real-time

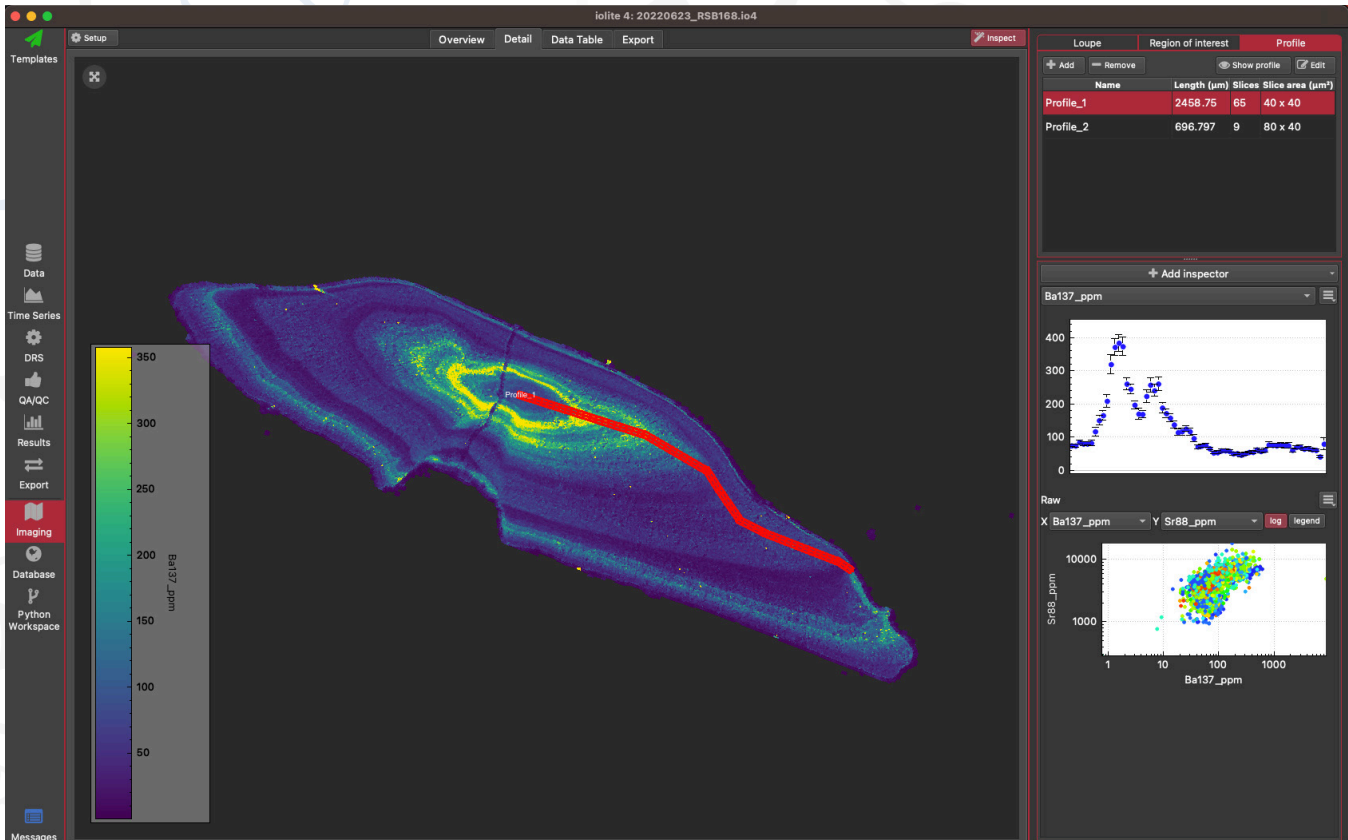


An *iolite* screenshot showing three downhole fractionation plots with variable models, along with histograms of the residuals (bottom right). A live concordia plot for unknowns is also shown (middle left).

Advanced Image Analysis

Laser ablation imaging is a revolutionary technique empowering new discoveries in earth, materials and life sciences. High-speed data collection requires efficient processing power to fully reveal complex details.

- Construct your images using actual laser coordinates to provide real sample geometries, even with irregular image areas.
- Display your images in a range of imaging options including stacked images, 3D plots, and more
- Built-in clustering and principal component analysis (PCA) capabilities provide advanced image analysis at your fingertips
- Draw regions of interest (ROI), or create ROI based on criteria. iolite will provide detailed statistics about measurements within the ROI to analyze individual parts of your image.
- Create profiles across images using an intuitive interface to easily get profile data



An example of a profile across an otolith. A range of data plotting options are available, with data from the profile shown on the right: a plot of data along the profile line (top); and, a plot of Sr vs Ba concentration data along the profile (bottom). Image courtesy of A/Prof A. Cruz-Uribe (UniMain).

Automation/Flexibility

Improve Throughput

Save time and improve productivity with templates – an integrated macro system for LA-ICPMS data workflows. By providing a range of actions to perform simple or complex tasks, iolite can significantly improve throughput:

With customizable levels of automation, the analyst remains in full control while freeing up valuable time.

iolite also removes the effect of inter-analyst bias by standardizing processes and improves accountability with reproducible and flexible templates. These templates are open and sharable so they can be exchanged between labs or enhanced based on what others have already created.

Create, Share Or Build Upon

With the integrated Python Application Programming Interface (API), iolite provides exceptional flexibility.

Create your own tools or use those created by others in the iolite community. With iolite's python API, you can use powerful scientific computing packages such as SciPy, SciKit-Learn and Matplotlib. iolite's API provides access to any data within iolite, whether it be your imported raw data, through to results calculated by iolite. You can create custom plots, dashboards, import and export modules and so much more. With iolite's python API, your imagination is the only limit.

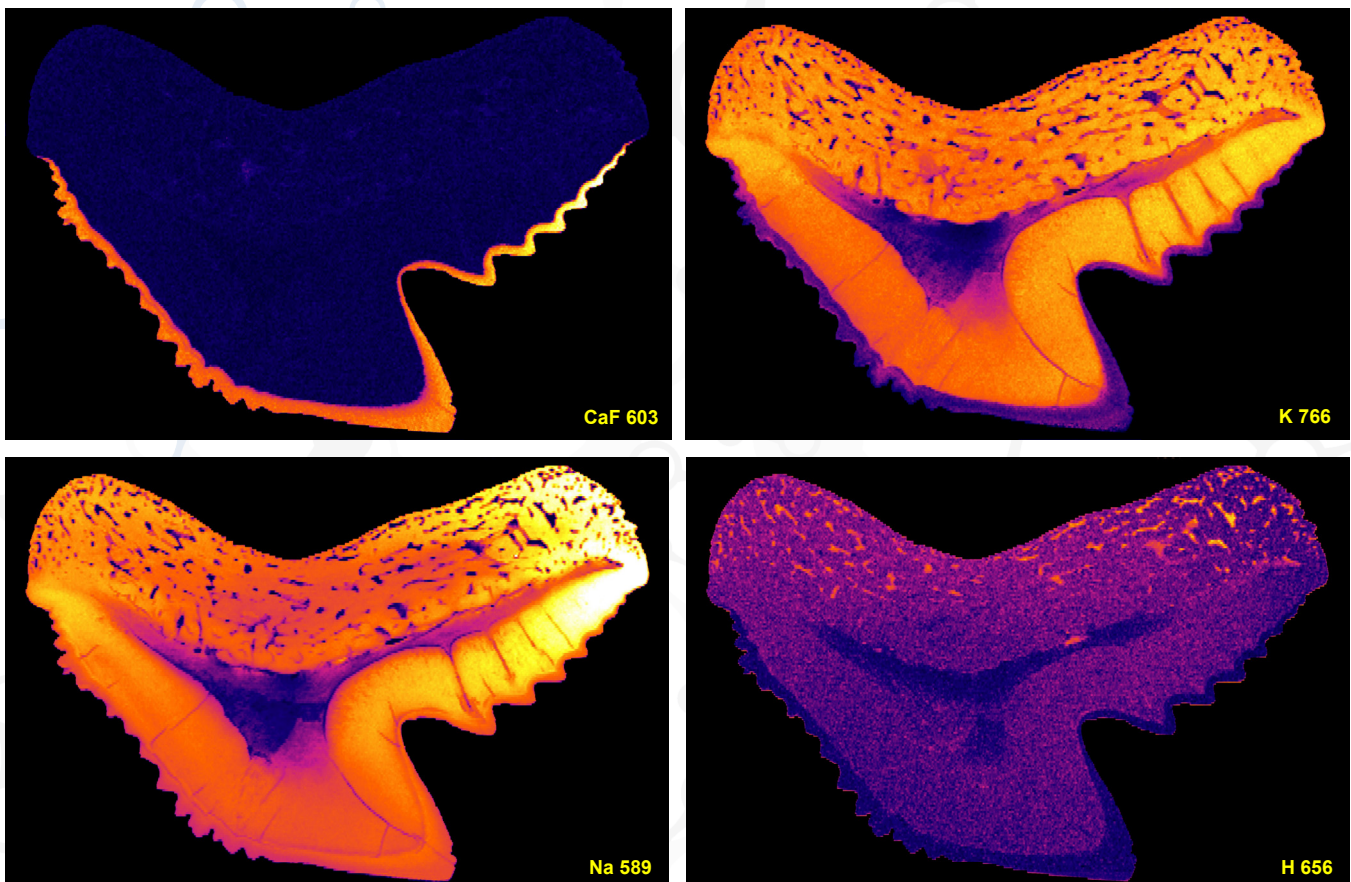
LIBS Data Processing

iolite provides a complete LIBS and LA-ICPMS data processing package. iolite can import LIBS data from ESLumen instruments to generate high quality elemental maps from majors through to trace elements, including simultaneous LIBS + LA-ICPMS experiments.

Full peak identification and peak integration options are available, including automatic peak detection and principal component analysis.

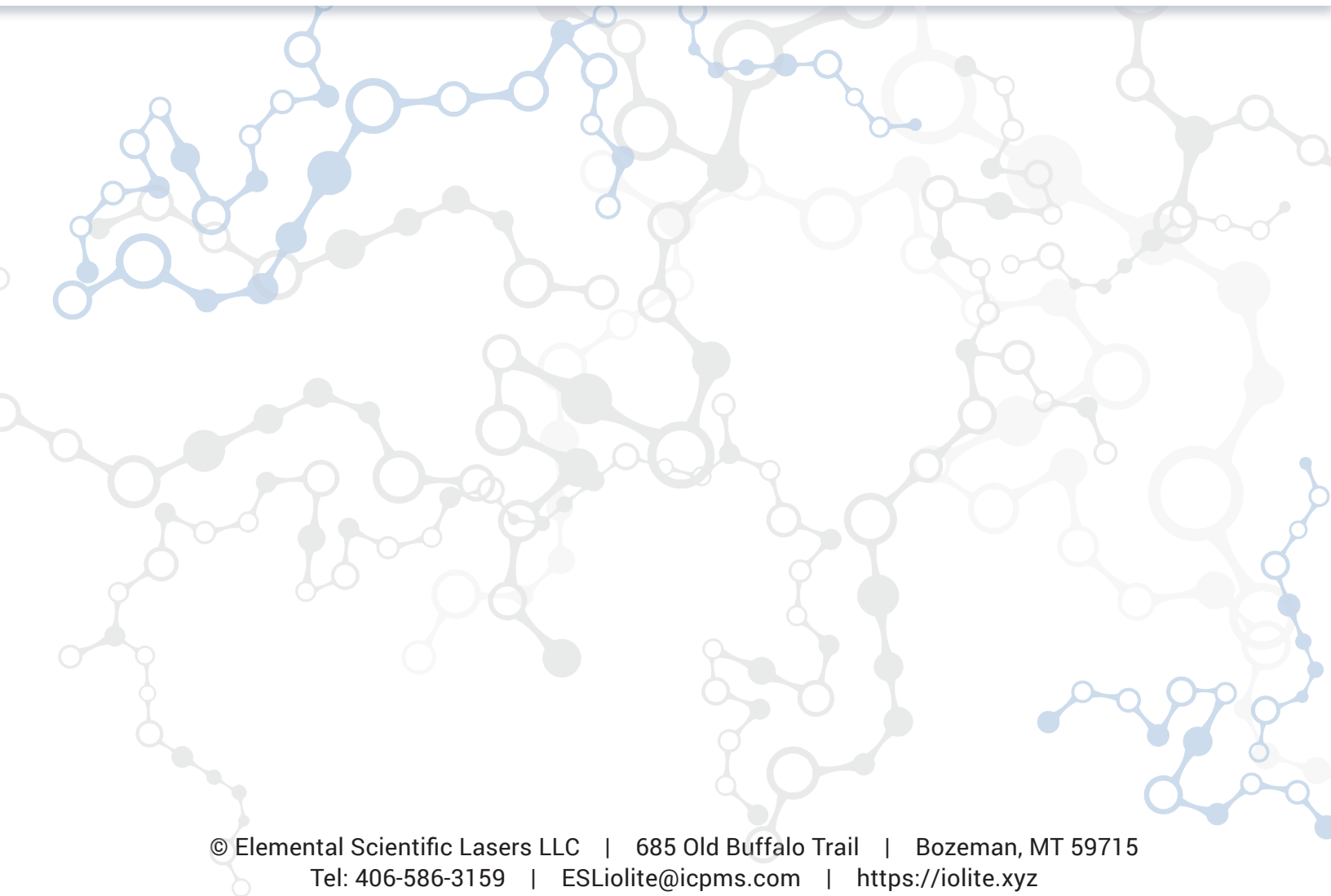
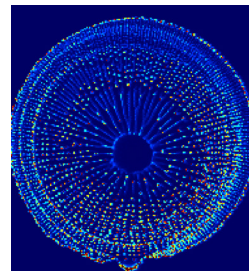
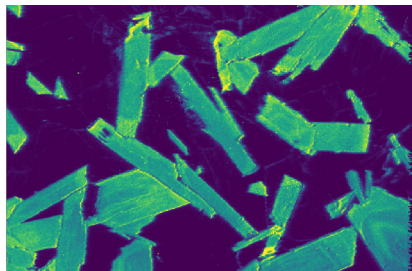
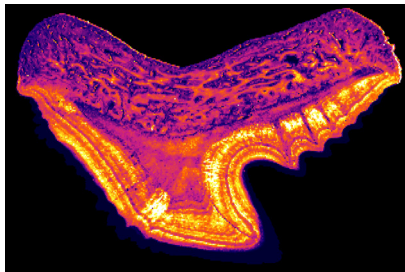
Flexible background subtraction options for LIBS data allow for better accuracy and reproducibility.

Save your peak settings and options as presets so that you can process multiple datasets with ease.



Tiger shark tooth LIBS elemental maps from the imageGEO193^{LIBS}.

Data courtesy of Oak Ridge National Laboratory and C. Derrick Quales.



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