A Novel Platform for High-Speed, High Resolution LIBS Imaging

Shayne Harrel1,*, Jean-Michel Laurent1, Antoine Varagnat1, Adrian Tercier2, Vincent Motto-Ros2
1. Andor Technology, Belfast, UK
2. Institut Lumière Matière, UMR5306, Univ. Lyon 1-CNRs, 69622 Villeurbanne, France

* s.harrel@andor.com

Abstract

Latest generation fast gated cameras based on cCMOS sensor technology provide significant enhancement in terms of high acquisition rates and simultaneously high dynamic range compared to CCD, Interline or EMCCD-based gated detectors. We present examples of advanced micro Laser-Induced Breakdown Spectroscopy (µLIBS) Imaging enabled by gated sCMOS technology and ultra-stable kilohertz Q-switch diode lasers. LIBS images with up to 4k definition (3840x2160 pixels) and spatial resolution down to 10 µm, obtained in less than 3 hours, are presented. Such results show the spatially resolved elemental distributions for several geological samples demonstrating high throughput and a great reduction in experimental time, while preserving chemical information integrity.

Conclusion

We demonstrate a novel platform for high-speed, high resolution LIBS imaging based on latest generation gated camera on sCMOS technology combined with ultra-stable kilohertz passive Q-switch laser pulses. LIBS images with up to 4k definition and spatial resolution down to 10 µm can be obtained in less than 3 hours without sacrificing chemical integrity information. This high-throughput approach provides a platform for which many new LIBS applications may be explored.

Acknowledgments

We would like to thank C. Dujardin, S. Hermelin (UCBL, Optolyse), Florian Trichard (Ablatom SAS), Cécile Fabre (GeoRessources), and Elena Vasileva (Hübner photonics) for their help and support.