

AN OVERVIEW OF THE LIBS DEVELOPMENT AND THE FUTURE OF IMPROVING ITS SENSITIVITY BY COMBINATION WITH OTHER TECHNIQUES. **M. Sabsabi**<sup>1</sup>, E. Soares de Lima Filho<sup>1</sup>, P. Bouchard<sup>1</sup>, A. Harhira<sup>1</sup>, J. El Haddad<sup>1</sup>, F. Vanier<sup>1</sup>, D. Gagnon<sup>1</sup>, I. ElHamdaoui<sup>2</sup>, A. Adame<sup>2</sup>, F. Vidal<sup>2</sup>, M. Constantin<sup>3</sup>. <sup>1</sup>Clean Energy Innovations Research Center, National Research Council Canada, 75 de Mortagne Blvd., Boucherville, QC J4B 6Y4 Canada; <sup>2</sup>Institut national de la recherche scientifique, Centre Énergie Matériaux Télécommunications, 1650 boul. Lionel-Boulet, Varennes, QC J3X 1P7, Canada; <sup>3</sup>Université Laval, Département de géologie et de génie géologique, 1065 Ave de la Médecine, Québec, QC G1V 0A6, Canada. (mohamad.sabsabi@cnrc-nrc.gc.ca)

As LIBS enabling tools (such as pulsed lasers, detectors and spectrometers) have rapidly evolved in the recent years, LIBS has seen significant advances and expanded adoption in geology, planetary science, defence, food, environment, industry, mining, biology, etc. Meanwhile, extensive research has been carried out to improve LIBS sensitivity and performance through the use of several approaches such as the double pulse mode, resonant LIBS, nanoparticles enhanced LIBS (NELIBS), combining LIBS with Laser-Induced Fluorescence (LIF) or infrared (IR), microwave, spark, Raman or XRF among other techniques. The analytical performance of LIBS for a multi-elemental analysis now achieves a level that is equal to, or even in some cases better than, that of classical methods. Improving the LIBS sensitivity involves several strategies aimed at enhancing the signal-to-noise ratio and increasing the detectability of analytes. In this presentation, we will highlight the new emerging approaches aiming at improving the LIBS sensitivity and its analytical figure of merit with the most significant research contributions for quantitative analysis by LIBS carried out in our laboratory and elsewhere. Finally, a personal viewpoint on the LIBS development and the future of its combination with others techniques will be given.