SMARTMining™

"Real-time monitoring allows for better decision making opportunities that ultimately save money"

> **Industry Challenge:** Ore Grade Reduction and Stringent Environmental Regulations

> **NRC Solution:** SMARTMining™ provides innovative solutions to forefront challenges using its extensive background in instrument and systems development, from concept level to on-site demonstration prototypes.

SMARTMining™ aims to provide real-time monitoring in various stages of the mining lifecycle - exploration, extraction, materials handling, refining and tailings. A notable application of SMARTMining™ is for pre-concentration of ore grades and for the sorting process in order to reduce the amount of barren materials as early as possible. In addition to significant economic benefits, this application will result in minimizing an environmental footprint, reducing energy consumption and lowering greenhouse gas emissions, thus enhancing the sustainability of the mining processes.

SMARTMining™ Suite of Technologiess

ORELIBS™

The NRC's ORELIBS™ technology is a powerful tool designed for fast on site ore grading and geochemical exploration. Elemental characterization of orebodies at the mine site will allow for swift decision making processes in real time. The first generation of this technology, based on laser-induced breakdown spectroscopy (LIBS), was developed for characterization of gold ores while the application can be tailored to other value materials as needed.

QEMonSITE™

On-site Quantitatively Evaluation of Minerals using LIBS based techniques or QEMonSITE™ generates real time and spatially indexed mineralogical data for value mineral phases, deleterious phases, and 'process performance phases', impacting on the throughput, flotation and leach performances. This technology represents a major advancement in next generation on-site coarse GeoSensing, both to support Grade Engineering® and process optimisation. The NRC team is working closely with The Cooperative Research Centre for Optimising Resource Extraction (CRC ORE) in Australia to develop the next generation QEMSCAN like technology for rapid ore scanning applicable for on-site operations such as on-belt ore sorting.

PYROLIBS™

The NRC's PYROLIBS™ is a breakthrough technology applicable for on-line and *in-situ* elemental and phase composition monitoring for molten metals. This technology does not require any sample preparation and can be implemented within the process control system for accurate real-time process optimization. A notable example of this application is for the smelting and conversion process. Control of the matte conversion in the smelting process is primarily based on the operators' experience. Molten metal samples are obtained manually and are sent to a laboratory for assays after quenching. This practice is inherently unsafe and time-consuming since molten metal is sampled intermittently. Application of PYROLIBS™ makes the reagent additions more precise, resulting in superior final product quality and reduction in toxic offgas.

CARBLIBS™

Improving bitumen recovery directly reduces costs and enhances environmental performance. CARBLIBS™ aids oil sands operators to increase bitumen recovery by using real-time monitoring of oil sand ores composition. Popular laboratory techniques used in the oil sands industry today require complicated preparation procedures that are costly and time consuming. As a result, techniques are sought for rapid bitumen content evaluation in oil sand ores, either in the laboratory or in on-line deployment. The laser-induced breakdown spectroscopy (LIBS) technique has the advantage of analyzing materials remotely, making it applicable to *in-situ* bitumen analysis on conveyer belts.

CONTACT

Dr. Alain Blouin
SMARTMining Technical Lead
Tel.: 1-450-641-5112
Alain.Blouin@nrc-cnrc.gc.ca
www.nrc-cnrc.gc.ca

National Research Council Canada
Conseil national de recherches Canada

Canada