



## Copper Ore | Copper and Iron Content

### Summary

Progression Inc.'s iPulse® Laser Induced Breakdown Spectroscopy (LIBS) analyzer provides accurate measurement of Cu and Fe in copper ores. These on-line measurements offer potentially significant economic and environmental benefits.

Progression is the leader in the development and service of on-line NMR and LIBS in the chemical and mining industries. In 2003, Progression won the prestigious R&D 100 award for the development of its second generation on-line NMR system—the MagModule II™. In 2006, the company successfully entered the phosphate industry with its first commercial iPulse application, which was used to measure MgO, CaO, Fe<sub>2</sub>O<sub>3</sub>, and Al<sub>2</sub>O<sub>3</sub> of phosphate rock on a conveyor belt. Other uses and applications are in development to measure iron ore, zinc and lead, copper and coal.

### Benefit

On-line LIBS provides operational and economic benefits to copper producers. Progression's instrument provides an analysis every 2 to 5 minutes. The data is transmitted to the plant's control system for either closed loop or operator control.

### Mining Applications

Many plants currently depend on either operator experience or infrequent laboratory analysis to control beneficiation operations. Adding Progression's on-line analyzer can allow a plant to improve beneficiation control as well as monitor rock feedstock thereby improving the use of reagents and increasing recovery of Cu.

### Sampling

In conjunction with the iPulse, Progression designs and installs application specific, customized sampling systems. Samples are either taken automatically from the process stream or analyzed on-belt. They may be returned into the process or sent to a disposal area depending on the needs of the customer.

Sample conditioning is typically not necessary. LIBS has the ability to measure solids, liquids, and slurries, without special

sample preparation. Further, the relatively small size (~30 ft<sup>3</sup>) of the instrument allows for optimal placement near sample points.

### Calibration and Results

System calibration and modeling is performed by Progression. Reference data is generated from samples taken at the process stream.

LIBS calibrations are made using reference values obtained by other techniques. Since the accuracy of these techniques can vary, it is impossible to specify an absolute accuracy. However, LIBS measurements have proven to be accurate based on both calibration and operational results.

