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Preliminary Report - Study of Copper Bearing Ores from Chile, Collahuasi.

Incoming samples

The 19 received samples contain grey, homogeneous powder.

The customer's task:

Analysis of Fe, Cu and Mo.

Typical copper ore UV spectra.

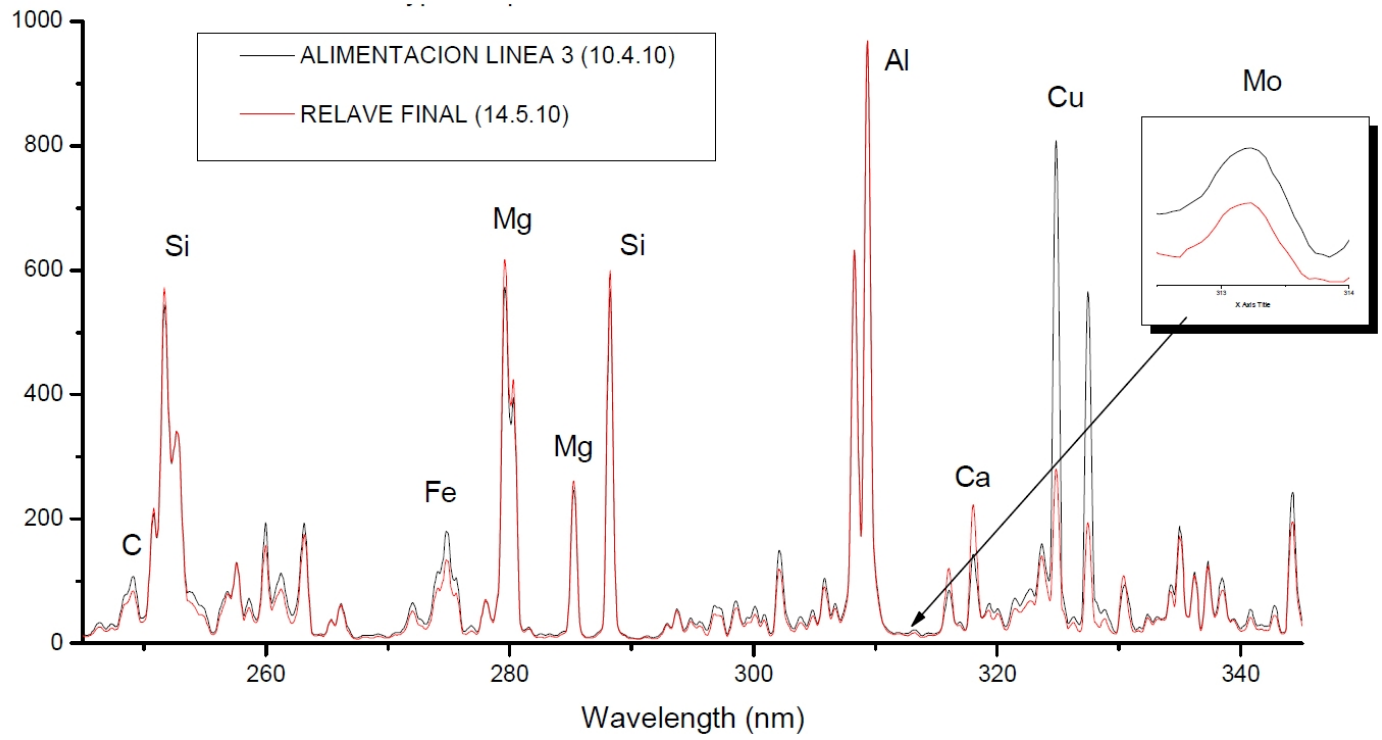
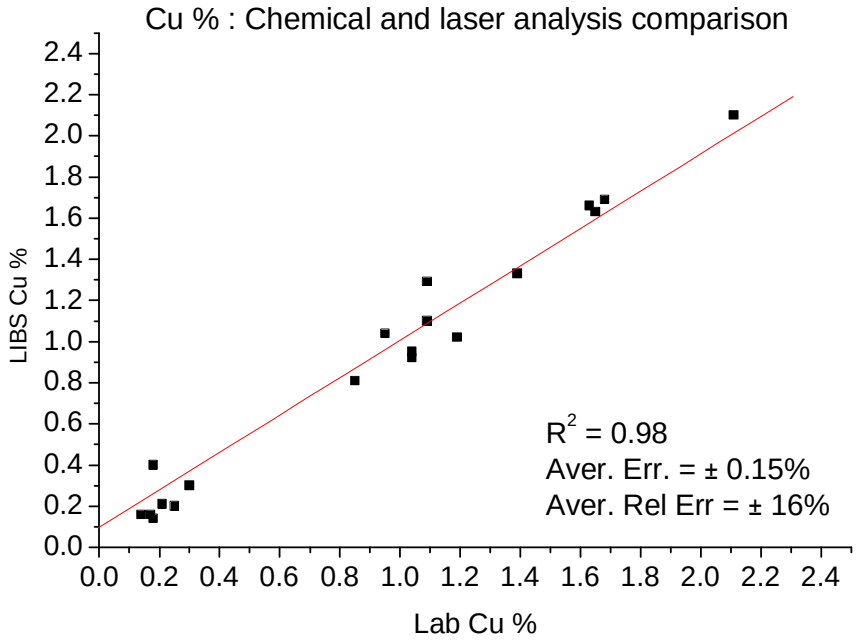


Figure1: Comparison of 2 samples with the most different content:" Alimentacion line 3" (black) and "Relave Final"(red).
According to UV spectrum Copper (Cu), Iron (Fe), Molybdenum (Mo), Carbon (C), Silicone (Si, Magnesium (Mg), Calcium (Ca) and Aluminum (Al) lines can be clearly detected.
From the comparison of the two samples shows content differences between them:
Alimentacion line 3sample contains higher Cu, Fe and Mo concentration.
Relave Final sample contains higher Ca, Si, Mg and Al than Alimentacion line 3sample.

According to spectral differences and using laboratory data for calibration curves, quantitative analytical algorithm was developed.

The results

Good Correlation between chemical lab and laser (LIBS) analyses is received for Fe, Cu and Mo.



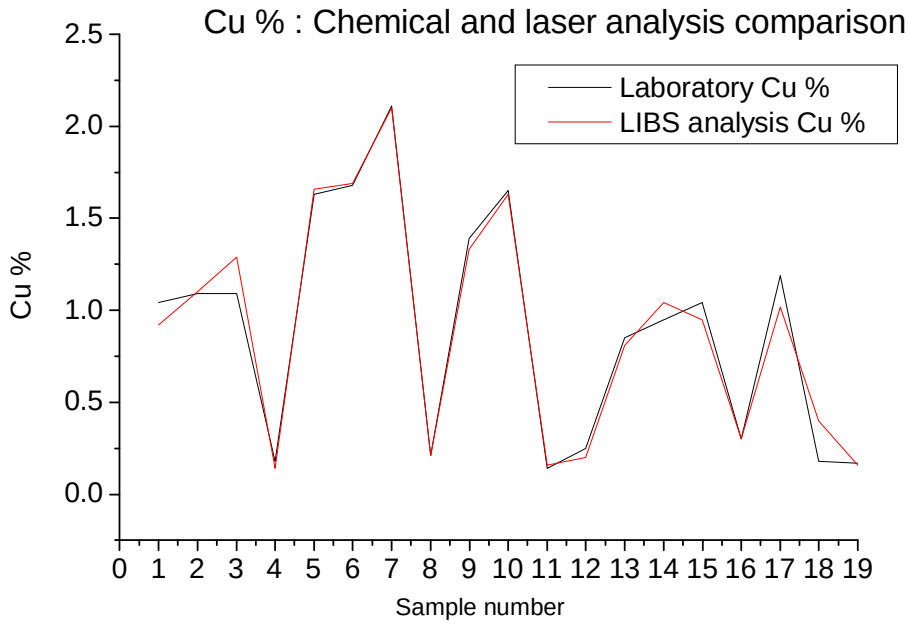
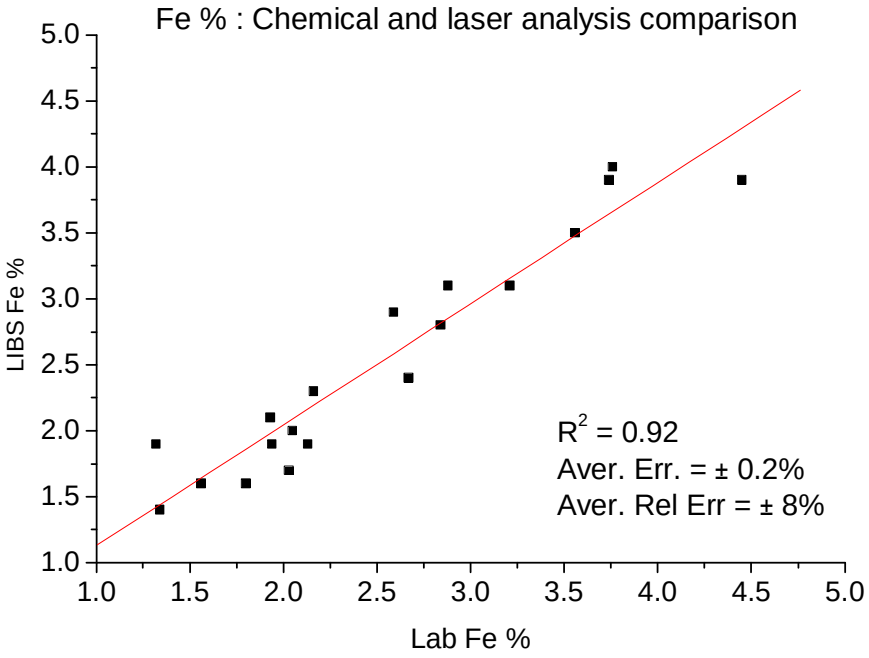


Figure2: X-Y and linear correlation charts of chemical and laser Cu % analysis. Very good (R^2=0.98) correlation is received. Average Absolute Error is +/- 0.15 %. Average Relative error is +/-16 %.



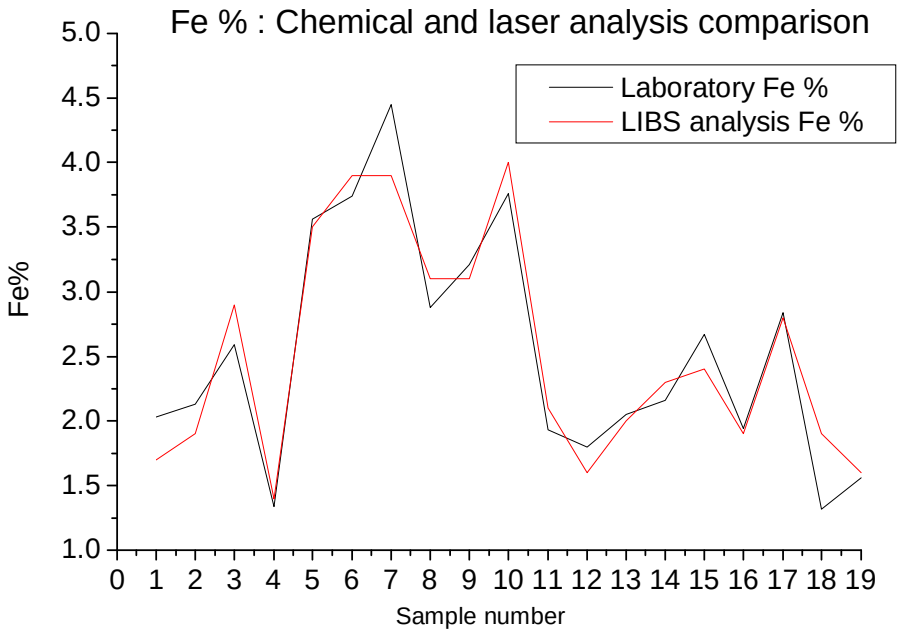
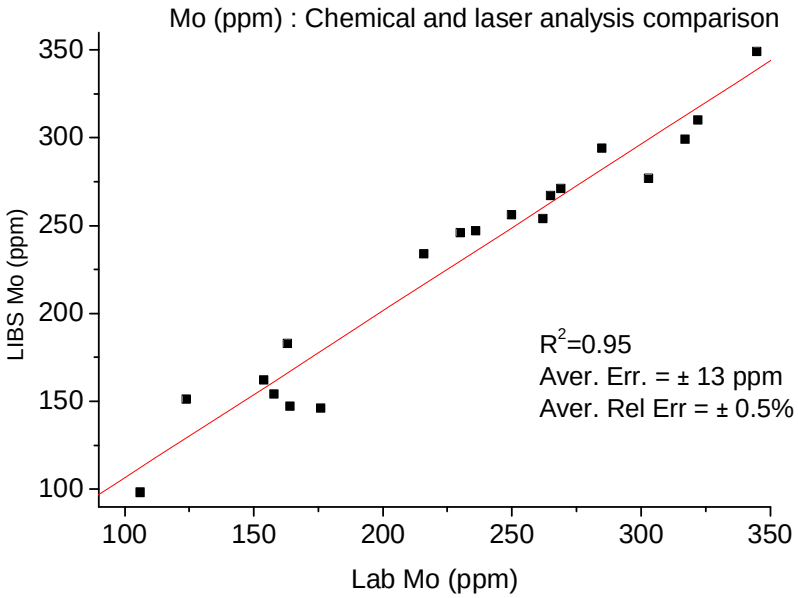
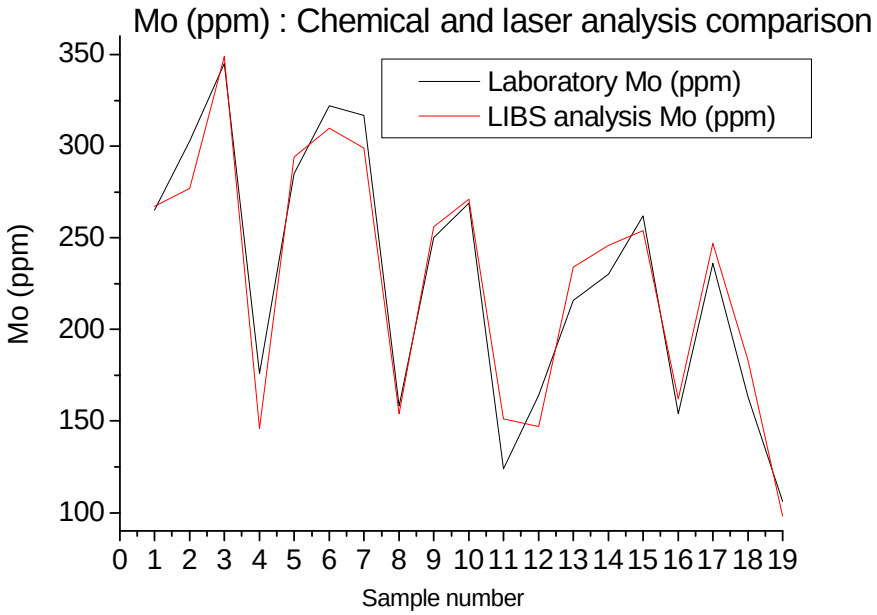


Figure3: X-Y and linear correlation charts of chemical and laser Fe % analysis. Good (R^2=0.92) correlation is received. Average Absolute Error is +/- 0.2 %. Average Relative error is +/-8%.





Figur4: X-Y and linear correlation charts of chemical and laser Mo analysis. Good (R^2=0.95) correlation is received. Average Absolute Error is +/- 13ppm. Average Relative error is +/-0.5%.

Conclusions:

All the required materials, Cu, Fe and Mo are possible to analyze by continuous on-line LIBS system.

High precision and good correlation are received for all analyzed elements.