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Imaging based on scanning Laser Induced Breakdown Spectroscopy; application for chromitite ore

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Scanning Laser Induced Breakdown Spectroscopy (LIBS) is a type of atomic emission spectroscopy that uses a laser-generated plasma to ablate, atomize, and excite material from a sample surface. It has potential for rapid non-destructive and in-situ multi-element geochemical mapping. LIBS can be used to rapidly map a large number of chemical elements, including light elements such as lithium. In LIBS-based images, each pixel represents (part of) a LIBS spectrum. The images qualitatively show the areas of metal enrichment/depletion. LIBS spectra, however, are significantly influenced by plasma variations due to physical and chemical matrix effects. Therefore, an appropriate multivariate calibration of the data is required for (semi)-quantitative analysis. LIBS-based imaging was applied to several meters of drilling core of chromitite ore from Merensky Reef (SA). The results allow a detailed investigation of the spatial geochemical/mineralogical variations from the millimeter up to the meter scale.