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Cryptic variations in the mineral chemistry of chromite, orthopyroxene, and plagioclase in the Merensky Reef and UG-2 chromitite of the Bushveld Complex – a new approach by scanning Laser Induced Breakdown Spectroscopy

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The UG-2 chromitite and the Merensky Reef of the Bushveld Complex in South Africa contains gigantic resources of platinum group elements (PGEs). Varies studies used the mineral chemistry of the associated minerals such as chromite, pyroxene, and plagioclase to get a better understanding of the genetic processes. In order to obtain this information, time-consuming electron-microprobe work is generally needed. A new approach using scanning Laser Induced Breakdown Spectroscopy (LIBS) was developed to unravel cryptic variations in the mineral chemistry of chromite, orthopyroxene, and plagioclase in drill cores from both Merensky Reef and UG-2. Chemical composition along the cores, as well as mineral classification of the LIBS data and variations in the mineral chemical composition are visualized, e.g. of Fe/Mg, Cr/Al, and Ca/Na ratios. The data can be used to highlight the presence of unusual patterns and to relate them to Ni, Cu, PGE or other mineralization. This method may become a powerful tool for comparing lateral variability of diagnostic horizons in vertical sequences in layered intrusions and is a very useful for further sampling on the drill cores for more detailed follow-up investigations.