A fully automated system for multispectral ore microscopy

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A joint research to develop an efficient method for automated identification and quantification of ores [1], based on Reflected Light Microscopy (**RLM**) in the *VNIR* realm (Fig. 1), provides an alternative to modern SEM based equipments used by geometallurgists, but for ~ $1/10^{th}$ of the price.

Fig 1: Equipment used on automated Leica DM6000M scope.

Quantitative measurements as reflectance and hardness, mainly *VHN*, are traditionally used to support RLM ore identification. Still, this relies mostly on qualitative observations, which can not be applied directly for automated reconnaissance. Today, accurate colour measurements [2] and systematic spectral reflectance data from QDF3 [3] provide a sound base for automation [4] and for multispectral imaging [5, 6]. Once automated identification is achieved [7, 8], processing the digital images can provide results similar or superior in discrimination compared to the SEM methods. The method is also more performant than the classical point-counter [9].

The automated ore identification procedure now presented is based on direct classification of individual pixels. Training of the identification system has been carried out by using actual pixel multispectral reflectance values of a subset of the mineral regions selected for the database. Tests of the system have provided very good recognition rates, well in excess of 99% of the pixels for mineral regions selected for the database. To further enhance the efficiency of the process, additional mineralogical criteria [10] may be applied.

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