

Pattern Formation In Mississippi Valley-Type Deposits

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ABSTRACT

One pattern which is frequently observed in the vicinity of economic Pb-Zn mineralization is the zebra dolomite (fig. 1). This rhythmic pattern consists of alternating dark and light dolomitic bands which also show a strong variation in the grain size between the layers. In addition to this grain size difference, a high density of second-phase material is present in the dark layers. The genesis of this structure and its association with the ore-forming processes is controversial

Our research approach is to study the pattern formation with a numerical model based on microchemical and microstructural analysis. The simulations are carried out in 2D at thin section scale and consist of two main processes, namely dolomitization and grain boundary migration affected by second-phase particle densities. The pattern evolving due to a redistribution of the initial second-phase particle scatter followed by grain growth influenced by the impurity densities is similar to those observed in the natural samples (fig. 2). Therefore we put forward a generic model of zebra dolomite formation based on the impurity redistribution by the dolomitizing front and grain growth affected by second-phase particle densities [1].

The crucial mechanism during the pattern formation in our model is the development of a layered impurity scatter. The redistribution process is likely to be related either to the dolomitization [2] or to the mechanics of the coupled fluid/solid system [3]. Which reorganization process is more likely to occur in the environment of zebra dolomites is currently the main research subject.



Fig. 1: Outcrop of zebra dolomite at the San Vicente mine, Central Peru.

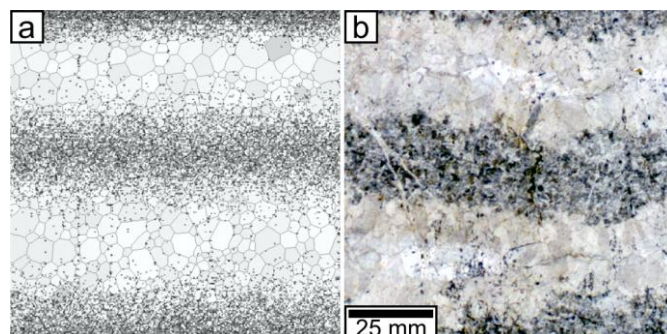


Fig. 2: Result of the numerical simulation (a) compared to a scan of a thin section (b).

References

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