Geophysical Research Abstracts
Vol. 16, EGU2014-5307-1, 2014
EGU General Assembly 2014


# On the origin of zebra textures in Mississippi Valley-Type Pb-Zn Deposits with a special emphasis on the San Vicente Mine, Peru

Ulrich Kelka and Daniel Koehn
University of Glasgow, School of Geographical and Earth Sciences, Glasgow, United Kingdom (ulrich.kelka@glasgow.ac.uk)

Alternating dark and white bands are common features of ore hosting dolostones which are generally termed zebra textures. Worldwide these structures occur in ore deposits of the Mississippi Valley-Type (MVT). This type of deposit frequently develops in hydrothermal systems located in the flanks of foreland basins. In most MVT ore deposits it is possible to distinguish between different stages which occur during the formation of the zebra textures and the precipitation of the ore-minerals (mostly Sphalerite and Galena). As the dark and white bands consist nearly completely of dolomite, despite the colour, the only clearly recognisable difference is the grain size.
Today there are several theories which try to explain the formation of this kind of structure, for example by dissolution-precipitation (FONTBONTÉ et al., 1993) or by displacive vein growth (MERINO et al., 2006).
Based on these theories and additional analytical findings, we want to develop a numerical model to study the banding and mineralisation. This model should include all processes from dolomitization, to the development of the zebra textures and finally the precipitation of Sphalerite and Galena.
Using optical microscope and SEM, we found, that there are also differences in the shapes of the grain boundaries of the fine grained dark (lobate) and coarse grained white bands (polygonal). Furthermore, there is a large number of second-phase particles, namely apatite, iron oxides and organic matter, present in the dark bands. Often these particles are lined up at the grain boundaries. These insights lead to the hypothesis that the grain growth in the dark bands is influenced by obstacles that reduce the growth rate and therefore lead to a bifurcation of this rate in the system.
For the modelling the microdynamic simulation software *ELLE* is used to perform a 2D-simulation at the scale of a thin section. This simulation uses a boundary-model coupled with a lattice-particle-code (BONS et al. 2001). The grain boundaries move according to a rate law based on dissolution-precipitation processes as a function of differences in surface energy. Layered distributions of particle densities are initially set as a background.
With this simple simulation of grain growth influenced by particle distributions we show, that this process is able to develop structural patterns that are very similar to those present in the natural samples from the San Vicente Mine in Peru.

## References

BONS P D, KOEHN D, and JESSELL W (2008) Microdynamic Simulation. Springer-Verlag Berlin Heidelberg

FONTBONTÉ L (1993) Self-organization fabrics in carbonate-hosted ore deposits: the example of diagenetic crystallization rhythmites (DCRs), In: Current research in geology applied to ore deposits. Proceedings of the Second Biennial SGA Meeting, Granada, Spain, p. 11 -14

MERINO E, CANALS A, and FLECHTER R C (2006) Genesis of self-organized zebra textures in burial dolomites: Displacive veins, induced stress, and dolomitization. Geologica Acta, Vol. 4 No. 3, p. 383-393