Remobilisation experiment of sulphides from massive Sulphide ore at 350°C and a differential stress without exotic fluid

L.X. GU[1], Y.C. ZHENG[1], X.Q. TANG[1], Z.J. WANG[2], C.Z. WU[1] AND X.Y. WU[2]

[1]State Key Laboratory of Endogenic Metal Deposits Research (Nanjing University), Nanjing 210093, China (lxgu@nju.edu.cn)

[2]Guiyang Institute of Geochemistry, Academica Sinica, Guiyang 550002, China

The sample for the experiment is massive sulphide ore free of intense deformation textures, and is composed mainly of pyrite (32%), pyrrhotite (8%), chalcopyrite (9%), sphalerite (7%), quartz (25%) and silicates (14%). Fluid inclusions in quartz have salinities in the range of 15.96 ~ 22.98 wt% NaCl equiv.

A sample cylinder 17 mm in diameter and 40 mm in length was dried in an oven at 100°C for 24 hours before being mounted in a 3-axes rock stress machine with piston-cylinder equipment. After the experiment for 13 hours at temperature of 350°C, confining pressure of 414 MPa and axial pressure of 1276 MPa, the sample was cooled at room temperatures for 24 hours.

In the experimental product, pyrite has been intensely cataclastically deformed, resulting in numerous cracks and angular fragments. By contrast, pyrrhotite, chalcopyrite, and sphalerite are dominated by plastic deformation. Remobilised chalcopyrite and pyrrhotite occur as veinlets cutting pyrite porphyroclasts or as cementing materials of pyrite fragments, whereas remobilised sphalerite is only seen in minor amount in a few veinlets. The sulphides in the veinlets and breccia metrix are not connected to the same minerals outside the pyrite porphyroclast, indicating that remobilisation was not in solid state due to mineral plasticity, but was driven by fluid. Under transmitted light, no dewatering textures of hydrous minerals have been observed, indicating that, the fluid for sulphide remobilisation in this experiment was derived mainly by breakdown of fluid inclusions.

The results of this experiment have lead to the following conclusions: 1) Deformation without exotic fluid can induce remobilisation of ore components. 2) Apart from metamorphic dewatering of hydrous minerals, breakdown of fluid inclusions due to deformation is capable to provide sufficient fluid for metal remobilisation. 3) Deformed pyrite is the best substrate for the precipitation of remobilised sulphides. 4) Sphalerite shows less strong tendency to remobilise than chalcopyrite under condition of the present experiment.

Petrography and Geochemistry Features of the Yoncayolu Metamorphics in Erzincan, NE Turkey

M. A. GUCER, Z. ASLAN AND O. BEKTAS

KTU, GMF, Department of Geological Engineering, Gumushane/Turkey (maligucer@ktu.edu.tr; aslan@ktu.edu.tr)

The study area is located of between transitional zone Pontide and Anatolide tectonic units, on the eastern of Erzincan (NE, Turkey). The aim of this study to explain mineralogy, pertography and geochemical characteristics of Yoncayolu Metamorphics. Permo-Triassic aged these metamorphics extend almost parallel to North Anatolian Fault and have lenses of phyllite, schist, calc-schist, quartzite, orthogneiss and metabasics of very-low grade, low-grade and often medium grade metamorphic rocks. These metamorphics are overlaid by Lias-Dogger aged Cayderesi Limestones. The Refahiye Ophiolite Melange cover both of these units tectonically [1].

In the study area, sericite+chlorite+quartz±muscovite-mineral assemblaged schists, amphibole+albite+K-feldspar+quartz±chlorite-mineral assemblaged gneisses, and quartz+sericite+calcite±chlorite-mineral assemblaged calc-schist are determined. Metabasics are characterized with light schistosity rather than formation of new minerals. Metamorphics are cut often by quartz veins and dense epidotization is observed at their contacts.

Metamorphics have a composition of 50-77% SiO_2, 9-21% Al_2O_3, 2-12% Fe_2O_3, 1-7% MgO, 2-5% Na_2O, 0,1-2,2% K_2O. Comparing to SiO_2 with major element values, a negative correlation between SiO_2- Al_2O_3, SiO_2- Fe_2O_3, SiO_2- MgO, SiO_2-CaO are seen whereas, there is a positive correlation between SiO_2-Na_2O. Similarly a negative correlation exist between SiO_2-Ga, SiO_2-Sr, SiO_2-Ni and a positive correlation between SiO_2-Nb, SiO_2-Zr, SiO_2-Y. Phyllite, schist and calc-silicate rocks fall in the within the calc-alcaline field on an AFM plot but metabasic rocks fall within the tholeiitic field. On the Ni-Zr/TiO_2 diagram all of the samples values point a igneous origin [2]. On the diagrams a positive correlation of K_2O versus Th, Ba, Rb are exists that are related to clay minerals within metamorphics.

Metamorphics exhibit an increase from very low grade to medium grade metamorphism along south to north.

References

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