

## **Genetic study of the micron-size sphalerite in pyrite from the Gengzhuang epithermal gold deposit, Shanxi, China**

Yaqun Ren\*, Fei Huang, Lizhang Yu, and Zhou Wang

School of Resources and Civil Engineering, Northeastern University, Shenyang, Shenyang, China, \*e-mail, renyaqunhu@163.com

Sphalerite is widely distributed in hydrothermal ore deposits. Pyrite, pyrrhotine, chalcopyrite, arsenopyrite, and sphalerite often are paragenetically intergrown, which is closely related to the conditions for deposit formation and shows important typomorphic significance. There are numerous studies of sphalerite morphology and its genesis in pyrite, but the microstructure and growth mode of sphalerite have not been researched extensively. In this study, a large number of typical sphalerite grains with varied morphology were identified in pyrite from the Gengzhuang gold deposit. We studied the morphological character of the sphalerite in pyrite systematically. We also deduced the mineral paragenetic sequence based on the morphology and chemical composition, and determined the genesis of micron sized nanoparticles of sphalerite in pyrite.

The Gengzhuang gold deposit, located to the north of Mount Wutai in Shanxi province, China, occurs in a crypto-explosive breccia pipe, which is closely related to Yanshanian age alkali-rich acid and intermediate-acid subvolcanic rocks. The deposit is moderate to low temperature epithermal deposit. The samples investigated in this study were mainly collected from a vein style orebody. Based on geological field work, as well as study of collected samples by petrographic observation, field emission scanning electron microscopy, and electron probe microanalysis, this research examines the occurrence of pyrite and sphalerite. Pyrite is present as a less euhedral crystal, and coarse pyrite is irregular in shape. Pyrite may be hypidiomorphic granular, allotriomorphic granular, and skeletal texture, which suggests it formed by metasomatism. The sphalerite grains in pyrite have emulsion, short columnar, quadrangular starlike, dendritic or irregular forms. Many dendritic sphalerite grains are 2~10  $\mu\text{m}$  in diameter and are scattered in their distribution. The emulsion size can reach 15  $\mu\text{m}$ , and the smaller crystals are at nanoscale size. According to the morphology and chemical composition of sphalerite, we concluded that sphalerite in pyrite resulted from the exsolution of originally Zn in solid solution in pyrite. The genesis of sphalerite records an evolution of the hydrothermal process, and we plan to analyze the exsolution mechanism further.