SEG 2017 Conference

Cathodoluminescence (CL) images and geochemistry of scheelite from the Tongshankou porphyry-skarn Cu-Mo-(W) deposit, Hubei Province, Eastern China

Minfang Wang*, Kun Liu, and Ketao Wei

Faculty of Earth Resources, China University of Geosciences, Wuhan, Hubei, China, *e-mail, wang_minfang@163.com

This study investigates the morphology and internal textures of scheelite using SEM–CL imaging and the elemental geochemistry in scheelite by EPMA and LA–ICP–MS, in the Tongshankou Cu–Mo–(W) deposit, Eastern China, which aims to illustrate the elemental geochemistry in scheelite and characteristics of ore–forming fluid. There are four different patterns in SEM–CL images and REE distribution patterns of scheelite. Due to the similarity of electronic configurations, ionic radii, and valence states between Mo^{6+} and W^{6+}, the substitution of Mo^{6+} for W^{6+} occurs in scheelite. The diagram between Mo and W shows the lower Mo content (average Mo content is 12,205 ppm) in sample ZK2002–18, but higher Mo content in sample B20SZK1–12 (average Mo content is 21,036 ppm), illustrating that scheelites from sample B20SZK1–12 are probably formed under a relatively more oxidized condition, which agreed with the conclusion based on Eu/Eu* value in these two samples. In addition, it is concluded that the higher Mo contents are related with darker CL images, whereas brighter CL images correlated with lower Mo contents. The ternary LREE–MREE–HREE diagram of scheelite indicates that it has characteristics of porphyry W–Mo and skarn–porphyry W–Mo deposits. Although many attempts were made to elucidate the ways of substituting the divalent Ca by trivalent REE in scheelite, the mechanism of $3\ Ca^{2+} = 2\ REE^{3+} + \square Ca$ ($\square Ca$= Ca site vacancy) should be suitable for scheelite in the Tongshankou deposit, due to the similar LREE/HREE enrichment occurred between scheelite and ore–related porphyry. In addition, the Eu/Eu* values and Mo contents in scheelite from the five samples, conclude that the ore–forming fluid becomes more and more reduced from the shallow to the deep, e. g. , the three samples from drill hole ZK2002, and more and more oxidized from the western part to the eastern part, e. g. , sample ZK2604–10 (northwestern part) and B20SZK1–12 (southeastern part).