Precise Pb/Pb age determination of Phanerozoic baddeleyites by multi-collector SIMS

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Baddeleyite is an ideal geochronometer for dating crystallization of mafic-ultramafic and alkaline intrusions by U-Pb method, because it contains variably high U and negligible initial common Pb, and appears less susceptible to Pb loss than zircon. However, precise SIMS U-Pb dating is inapplicable for baddeleyite owing to crystal orientation effects that bias Pb/U measurement [1]. Baddeleyite can only be dated by SIMS Pb/Pb measurements, which is difficult to date Phanerozoic baddeleyite due to low ^{207}Pb abundance and limitation of analytical precisions.

We carried out a series of tests of Pb/Pb measurements on Phanerozoic baddeleyite using a large radius magnetic sector multi-collector Cameca 1280 SIMS. An NMR controller was used in multi-collector measurement to stabilize the magnetic field, with an instrumental drift ($\Delta M/M$) less than 2.5 ppm over 16 hours. Oxygen flooding to the sample chamber enhances Pb^+ sensitivity by a factor of seven. The secondary ion yields of each EMs were calibrated using a constant ZrO signal relative to the axial EM, and further fine-tuned against repeated Pb/Pb measurements of the Phalaborwa baddeleyite standard.

Multi-collector SIMS measurements of baddeleyites from the Hekanzi Syenite from North China and the Xialan Gabbro from South China yielded Pb/Pb age of 227 ± 2 and 194 ± 4 Ma, respectively, well consistent with zircon U-Pb ages of 225 ± 2 and 195 ± 2 Ma of each intrusions. Our results demonstrate that Phanerozoic baddeleyites can be precisely dated by Pb/Pb method using multi-collector SIMS.

[1] Wingate & Compston (2000) *Chem. Geol*. **168**, 75-97.

Indium mineralization in Dachang Tin deposit, South China

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Dachang tin deposit is located southwestern margin of the Jiangnan tectonic belt, South China. It has a potential indium resources more than 6000 tonns. Ores occur as stratified, large veins, stockwork, skarn and massive bodies. The geochemistry data indicate the indium was distributed heterogeneously in different orebodies and host rocks. Indium in bedding limestone, siliceous rocks, granite are lower than that in crustal, whereas indium contents in estern dike granite porphyry and western dike diorite porphyry are higher. In estern dike and west dike, indium concentrations are 0.17-0.22ppm, and 0.14ppm, respectively.

No.105 massive orebody has highest indium, it ranges from 183ppm to 781ppm and range from 2.39ppm to 331ppm in No. 92 and 91 vein orebodies. But in the Cu-Zn skarn orebody it has lower content (56.2ppm). The indium contents has a positive correlation with zinc contents in orebodies, but has poor correlation with copper contents.

EMPA data show that the concentration of indium in sulfide minerals are variable. In No. 91 orebody, indium content in sphalerite range from 0.03wt% to 0.12wt%, in pyrite 0.003wt%, in arseopyrite 0.006wt%. No indium was detected in cassiterite. Most of indium host in iron-rich sphalerite. Pyrite from the granite porphyry also has a indium composition of 0.002wt%.

Indium values in wall rocks, different orebodies, and sulfides indicated the indium mineralization in Dachang tin deposits are assicoated with magma process. Indium-rich metarils is proposed in the magma source under the Dachang Tin deposit.

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