In situ sulfur isotope measurement in sulfide using femtosecond laser ablation MC-ICP-MS

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We synthesized a new glassy chalcopyrite standard(Fig. 1) for micro in-situ S isotopic composition analyses in chalcopyrite using femtosecond laser ablation multi-collector inductively coupled plasma mass spectrometry (fsLA-MC-ICP-MS). The Nu1700 MC-ICP-MS was optimized at high resolution mode (Resolution power = 10000RP) to separate any interference peaks completely on ^{32}S. The intensity of ^{32}S was 8-20V for laser ablated spot sizes 10-20μm (diameter).

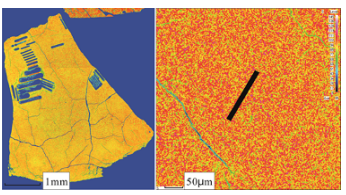

Fig. 1 BSE and electron probe scans images of glassy chalcopyrite show a great content uniformity of sulfur.

We synthesized a new sulphur standard for in-situ S analysis using following procedures: 1) picking out the pure and unoxidized chalcopyrite under a stereoscope; 2) cleaning and grinding the pure chalcopyrite down to 800 mesh; 3) melting the chalcopyrite powder for 3min in 1000℃ under the protection of nitrogen environment; 4) pouring the liquid melt into iced high purity water as quickly as possible. The homogeneity of the glass was evaluated using fsLA-MC-ICP-MS. Thirty three measurements of the glass were carried out and the external precision of $\delta^{34}S$ was 0.29‰ (n=33). The S isotope composition of this glass was measured using both fsLA-MC-ICP-MS and GS-MS. The $\delta^{34}S$ results for the two techniques were 0.43±0.12‰ (n=3) and 0.53±0.22‰ (n=3), respectively. This standard can be applied for S measurements using micro-beam analytical techniques, which is important for multi-stage mineralization researches.