Pb-Pb evaporation method on native gold grains

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Introduction

In this work is presented a new method of measure of isotope Pb ratios in native gold samples. In opposite of classical method of bulk chemical digestion and Pb separation for gold, this new method is faster and provides more information.

Analytical procedures

Small gold grains (0.3-1 mm) were rolled into foil, and were cleaned by the following acid sequence (using ultrasound and 100° hot plate treatment): 10N HF; H_2O; 6N HCl; H_2O; 14N HNO_3; H_2O during 30 min for each step. After that, each grain was deposited on Re single filament with 5 µl of mixture of silica gel and H_3PO_4. Lead isotope ratios were analysed by Finnigan MAT-262 mass-spectrometer in ion counting jumping mode and static Faradey cups mode at temperatures 1330-1570°C. The typical error levels 2_% for 206/204 ratios in non-radiogenic samples are 0.05-0.1%, in high-radiogenic samples are >0.5%.

Results and discussion

For Pb isotope studies were taken the native gold grains from veins of ore deposit Alemão (Carajas, Brazil) and ore-deposits Areal and Mina Velha (Gurupi belt, Brazil).

Gold samples from Gurupi belt deposits show non-radiogenic common lead composition and provide sufficiently high stable signal (~100 mV 206 mass) on Faradey cups and stable isotope ratios during measures. Samples points of Mina Velha lie near Doe-Zartman curve for mantle in age range 1200-1300 Ma.

Gold grains from Alemão ore-deposit show high-radiogenic lead composition and demonstrate low signal (<5 mV 206 mass) on ion counter. The 206/204 Pb ratio increased during analysis from block to block in most samples, in some of them up to 1.5 times and varied in range 50-1000. These big variations in 206/204 ratios are probably caused by small invisible impurities of other U-rich minerals. Because of these variations the 206-207 isochron calculations were made using separate block data. Three groups of 206-207 isochron data were obtained: 3529±50, 2770±24 Ma, 2132±17 Ma. The second age is concordant with 206-207 isochron age for sulfides.

Conclusions

The proposed new Pb-Pb evaporation method for native gold analysis may be useful for detail studies of gold mineralization and possible diagnostic tool for detection of origin of jeweler gold.

An update on the Köfels ^{10}Be and ^{26}Al production rates

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A giant landslide of Köfels, Tyrol, Austria occurred 9800 years ago. This site is ideal to determine the production rates of cosmogenic ^{10}Be and ^{26}Al for exposure dating, because the timing of the event could be dated dendrochronologically [Ivy-Ochs et al., 1998; Kubik et al., 1998]. The originally measured nuclide concentrations [Kubik et al., 1998] were scaled to sea level, high latitude using the scaling formalism of Lal [Lal, 1991]. Recent work [Stone et al., 1998; Heisinger et al., 2002a; Heisinger et al., 2002b] indicates that the contribution due to muons was overestimated. The original production rates have thus been revised in light of this. In addition, a new field campaign was conducted last year and this new data will be added to the existing data set.

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