

南薩型金鉱床における Au の挙動

Geochemical behavior of gold in Nansatsu-type gold deposits

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Gold (Au) is one of the most important metals in our society, used not only in making jewelry and financial transactions but also in various electronic devices and aerospace technology. Au generally occurs as an ore-forming mineral of hydrothermal deposits [1]. The Nansatsu-type gold deposits in the southern area of Kagoshima, Kyusyu, on which this study focuses, are the representative hydrothermal gold deposits in Japan.

In order to explore undiscovered gold deposits, understanding of the formation mechanism of high-grade hydrothermal gold deposits is important. In this respect, elucidation of the behavior of Au during the formation of gold deposit constitutes a key constraint. However, the behavior of Au on the formation of hydrothermal deposits has not been fully understood. This is partly because the concentration of Au in the ore and ore-forming fluid is significantly lower compared to those of the major elements such as Fe and Cu.

In this study, therefore, we conducted multi-trace element analysis (including Au) of the ore samples collected from the Kasuga and Akeshi deposits by using ICP-MS. As a result, we found out that the sulfide (mostly pyrite) samples from the Akeshi and Kasuga deposits can clearly be divided into two groups by their composition: higher As group (> 200 ppm) and lower As group (< 100 ppm). The samples of the higher As group show strong positive correlations between Au and As ($r=0.99$) and between Au and Pb ($r=0.87$). In contrast, the samples of the lower As group show no clear correlation among Au, Pb and As contents. Instead, the Au content of these sulfide samples correlates well with Cu ($r=0.67$) and Co ($r=0.75$). These results imply that the elements associated with Au are different in the two groups. The contrasting geochemical features in the two groups of sulfide minerals might suggest that two hydrothermal fluids that had distinct chemical composition were involved in the Au-mineralization in the Nansatsu-type gold deposits.

[1] Mariko, T (2008) Geology of Ore Deposits. Kokin-Shoin, Tokyo, 580 p (in Japanese)

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