Pb isotope ratios of the Akeshi Au deposit, Kagoshima, Japan: Implication for gold mineralization

SHUMPEI MURAKAMI[1], KOICHIRO FUJINAGA[2,1], SHUHEI ARAKI[3], JUNICHIRO OHTA[4], KAZUTAKA YASUKAWA[1,2], KENTARO NAKAMURA[1], YASUHIRO KATO[1,2,4]*, KYOHEI KUROKAWA[5], HIKARU IWAMORI[4,6], KAZUYA NAGAISHI[7], TSUYOSHI ISHIKAWA[4]

[1] School of Engneering, Univ. of Tokyo (shumpei-m□egeo.t.u-tokyo.ac.jp)
[2] Chiba Institute of Technology
[3] Mitsui Mineral Development Engineering Co., LTD.
[4] JAMSTEC
[5] Mitsui Kushikino Mining Co., Ltd.
[6] Dept. Earth Planet. Sci., Tokyo Institute of Technology
[7] Marine Work Japan Co., Ltd.
(*Corresponding: ykato@sys.t.u-tokyo.ac.jp)

Elucidating the origin of the deposits can provide a crucial key constraint in exploration for new mineral deposits. For epithermal deposits, it is commonly considered that ore-forming fluids originated from hydrous magmas and/or created by circulation of the meteoric water within the shallow crust play an essential role. The previous mineralization models have been proposed on the basis of isotopic study of relatively light elements (e.g., H and O) in ore-forming fluid [1]. However, recent isotopic studies on heavy metals (e.g., Pb and Nd) suggest the involvement of another important component, i.e., slab-derived fluid, to the formation of epithermal ore deposits [2].

In order to detect direct information of source of metals contributing to the formation of epithermal gold deposits, we study Pb isotopic compositions of sulfide ores from the Hishikari and Akeshi gold deposits both in Kagoshima, Japan. Analytical results suggest that some ore samples are consistent with the previous ore-forming model indicating shallow fluid circulation. However, several ore samples imply that slab-derived fluid contributes to mineralization of hydrothermal ore deposits as was recently suggested [2]. The relationship between Pb isotopic ratio and the Au concentration also suggests that both the bed rock and the slab-derived fluid contribute to the Au mineralization.

[1] Hedenquist and Lowenstern (1994) *Nature* **370**, 519-527.
[2] Fujinaga et al. (2013) GEOFLUID 3.