Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BBG21-P09 Room:Convention Hall Time:May 21 10:45-12:15

Mineralogy and geochemistry of hydrothermal ores collected from active hydrothermal fields in shallow water depth

OOKI, Mitsuhiro[1*], MIYOSHI, Youko[1], SHIMADA, Kazuhiko[1], ISHIBASHI, Jun-ichiro[1], NOZAKI, Tatsuo[2]

[1]Faculty of Science, Kyushu University, [2]JAMSTEC

Since boiling is inhibited by hydrostatic pressure, hydrothermal fluid circulates below the seafloor in a liquid phase that can dissolve much amount of elemental species. Metal elements transported by the hydrothermal fluid precipitates near the seafloor due to cooling, which results in formation of seafloor massive sulfide ore deposits. If hydrothermal activity develops at shallower water depth, the boiling point is limited to lower temperature. Since solubility of metal elements is strongly controlled by fluid temperature, the limitation of fluid temperature would affect mineralogy of hydrothermal ores precipitated at rather shallow water depth. In order to find this influence in natural systems, we studied mineralogy and geochemistry of hydrothermal ores collected from two active hydrothermal field in the Okinawa Trough, both are located at water depth shallower than 1000 m.

Hydrothermal ore samples were collected during NT11-20 expedition using ROV Hyper-Dolphin (JAMSTEC), from Minami-Ensei Knoll at water depth around 700 m, and from Yoron Knoll at water depth around 600 m. Dominant minerals in the ores were determined by XRD (X-ray diffraction) analysis. To identify minor minerals and to determine chemical composition of the representative minerals, EPMA (Electron Probe Micro Analyzer) analysis was conducted. Neutron activation analysis was conducted to determine bulk content of some trace elements.

Major sulfide and sulfate minerals commonly found in the hydrothermal ores were barite, sphalerite, galena, pyrite, chalcopyrite, stibnite, orpiment, tetrahedrite and Pb-Ag-Sb sulfide mineral. A few ores included covellite and Ag-S sulfide mineral as trace mineral. The tetrahedrites showed diversity in chemical composition. Ag content of the tetrahedrites was 0 to 2.8 atm% for the ores from Minami-Ensei Knoll and 2.6 to 9.5 atm% for those from Yoron Knoll. It is well known that higher Ag content in a tetrahedrite is related with relacement of As by Sb in higher proportion. This tendency was confirmed among the ores we studied. FeS content in ZnS is known as an indicator for oxidation-reduction environment during ore formation. FeS/ZnS ratio was 0 to 3.2 mol% for the ores from Minami-Ensei Knoll and 0 to 2.7 mol% for those from Yoron Knoll. The low FeS content would reflect formation under rather oxidative circumstances.

Keywords: Seafloor massive sulfide, tetrahedrite, sphalerite, Okinawa Trough