Mercury Leaching from Seafloor Massive Sulfide Deposits

AKINORI TAKEUCHI*[1], SHIGESHI FUCHIDA[2], AND MASANOBU KAWACHI[1123]

[11]National Institute for Environmental Studies, 16-2 Onogawa Tsukuba-shi, Japan (*correspondence: takeuchi.akinori@nies.go.jp)

[23]Waseda University, Japan (sfuchida@aoni.waseda.jp)

Evaluating potential environmental impacts of seafloor metal-mining is an important aspect in the natural resource exploitation. Seafloor massive sulfide depostis tend to contain a large amount of mercury (Hg), one of the highly toxic elements, and it has been concerned about the Hg contamination occurs by accidental leakage and dispersion of sulfide ore particulates from mining vessels into the upper ocean. The potential Hg leaching into aerobic artifical seawater and phosphate buffer solution (pH = 6.86) from 4 different hydrothermal ore deposits collected from the Okinawa Trough in Japan was investigated. Hg concentrations of the ore deposits ranged from approximately 7.5 to 658.5 μmol/kg. The ore sample in which realgar (AsS) was barely identifed showed the highest amount of Hg. The only pyrite (FeS)-rich ore sample (~73 μmol/kg), however, showed the Hg leaching into the seawater within 5-min by approximately 1.5% of the initial Hg conent in the ore sample. Both FeS-rich sample and the one with the highest Hg concentration, on the other hand, demonstrated the Hg leaching into the buffer solution within 5-min. The buffer solution also prompted more Hg leaching from the FeS-rich sample. Approximately 2.5% of the intial Hg content in the sample was detected in the solution. These results suggest that the Hg leaching from seafloor sulfide ore deposits occurs with specific mineral assemblage. Pyrite specially involves in the Hg release probably via mineral dissolution and generation of sulfate under aerobic aquatic condition.