Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.35808

# First assessment of dissolved gold, platinum, and palladium in hydrothermal fluids from subduction zones

**MIYU TAKANO**, ATSUKI MIZUTANI, LINJIE ZHENG AND YOSHIKI SOHRIN

Kyoto University

Gold (Au), platinum (Pt), and palladium (Pd) are abundant in sulfide ores formed by hydrothermal activity around subduction zones. However, the dissolved concentrations of these elements in hydrothermal fluids remain unknown, because the analysis is challenging due to their low concentrations and the inertness of their complexes. Recently, we reported that a chelating resin bearing ethylenediamine groups (TYP-en) can quantitatively collect chloride complexes of Au(I), Au(III), Pt(II), Pt(IV), and Pd(II)[1]. In this study, we developed a new analytical method for trace levels of Au, Pt, and Pd based on TYP-en column extraction, elution with HCl-thiourea solution, and determination by ICP-MS. We then applied this method to hydrothermal fluid samples collected from hydrothermal sites in the Izu-Bonin Arc and the Okinawa Trough.

We found that 18–99 pmol/kg of Au(III), Pt(IV), and Pd(II) added to HCl solutions and seawater were quantitatively recovered using our method. The procedure blanks determined for 51 g HCl solution ranged from 0.9 to 7.1 pmol/kg. As preliminary data, a hydrothermal fluid sample from the Higashi Aogashima Knoll Caldera in the Izu-Bonin Arc contained 15 pmol/kg Au, 5.6 pmol/kg Pt, and 12 pmol/kg Pd. A hydrothermal fluid sample from the Izena Hole in the Okinawa Trough contained 345 pmol/kg Au, 8.2 pmol/kg Pt, and 8.5 pmol/kg Pd after ozone aeration, which is expected to improve the recovery of these elements by oxidizing sulfide ions and Au(0). These concentrations are significantly higher than those in seawater, suggesting hydrothermal circulation contributes to the enrichment of these elements in sulfide ores. However, the recoveries of the three elements added to hydrothermal fluid samples have so far being insufficient. We are currently conducting further optimization to improve the reliability of the method and will report the updated results in our presentation.

[1]Iwase M., et al. (2023) *Anal. Sci.*39, 695–704.