

Developing in-house artificial standard for gold for PPP-LA-ICP-MS analysis

Gold is a precious metal with a low concentration in Earth’s crust (~1.2 ng·g⁻¹) while Au ore is economically exploitable when it contains more than 1 µg·g⁻¹ of Au. To achieve a three orders of magnitude enrichment, Au must be mobilized from a source, transported by a fluid and concentrated in the crust by efficient precipitating mechanisms. Hence, determining Au concentration in rocks is critical to estimate their fertility and monitor mobilizing processes. During the last years, we developed a cheap, fast and reliable method to analyze gold by laser-ablation inductively-coupled-plasma mass-spectrometry on pressed powder pellets (**PPP-LA-ICP-MS**), reaching limit of detection for Au as low as **0.10-0.05 ng g⁻¹**, enabling analysis of Au distribution in Au-depleted rocks (Patten et al. 2023). However, the available standards for Au have values ranging between **5 and 10 ng·g⁻¹** (Fig.1), preventing precise data calibration, especially for higher Au contents. The objective of this bachelor project is:

- 1) to develop a set of in-house artificial Au standards (e.g. 1, 10, 50, 100, 250, 500, 1000, 5000 and 10000 ng·g⁻¹ Au) using blank material (epidosite) and a Au solution.
- 2) Use these in-house artificial Au standards to analyze samples with known composition and estimate the impact of new calibration curves for Au.

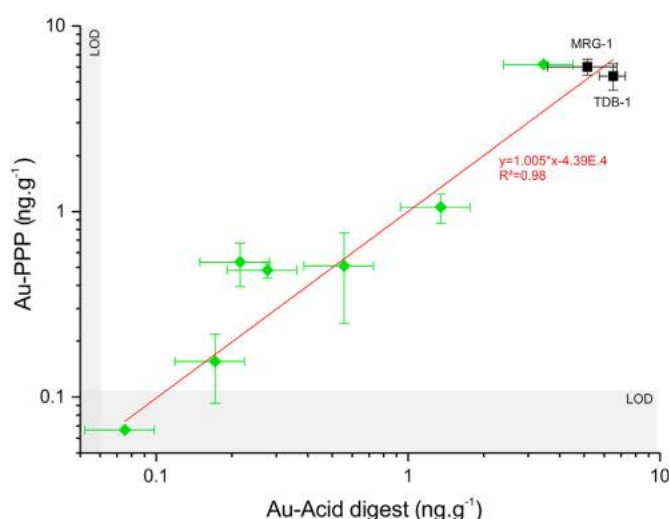


Fig.1 - Method validation by comparing Au concentrations of natural samples from the Troodos ophiolite (green) and reference materials (black) analyzed by both PPP-LA-ICP-MS and by multi-acid digest ultra-low detection limit Au method from Pitcairn et al. (2006)

Reference:

Patten CGC, Beranoaguirre A, Hector S, Gudelius D, Kolb J, Eiche E (2023) Improved whole rock low detection limit gold analysis by LA-ICP-MS utilizing pressed-powder-pellets. *Int J Mass Spectrom* 488:117039

I.K. Pitcairn, P.E. Warwick, J.A. Milton, D.A.H. Teagle, Method for ultra-low-level analysis of gold in rocks, *Anal. Chem.* 78 (2006b) 1290e1295

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