Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.9653

Establishing and Calibrating the Zr Isotope Reference Material (iRM)

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Over the past two decades, the field of stable isotope geo- and cosmochemistry has expanded from the so-called "traditional" systems (H, C, N, O, S) to include most of the periodic table. For each new isotope system being developed, the issue of defining an isotopic reference material (iRM) is a critical task that is, unfortunately, not always given sufficient consideration. This has led to problematic situations where data are reported relative to iRMs that were either inadequate (*e.g.*, isotopically heterogeneous), not readily available, rapidly exhausted (*e.g.*, JMC Lyon Zn), or not broadly agreed upon (*e.g.*, various in-house Mo standards in the literature).

As the field of (mass-dependent) Zr stable isotopes is starting to develop [*e.g.*, 1-4], it is in the community's best interest to establish and rigorously calibrate an iRM early on. Desirable key features that a proper iRM should have [5] include isotopic homogeneity, wide availability, conflict-of-interest–free distribution, and sufficient stock to last decades.

To this end, a Zr iRM [6] was conceived and developed in a collaboration between NIST, Caltech and U. Arizona, and is currently being calibrated as a community effort. A large batch of ultra-pure Zr metal was dissolved and three separate aliquots of the solution were shipped from NIST to each participating laboratory. After aliquoting and measuring each solution in duplicate over non-successive days, each group shipped the remainder of the solutions to another laboratory for analysis. Results of this inter-laboratory calibration effort for the NIST RM8299 Zr iRM will be presented at the conference.

The ultimate goal of this effort is to produce a material that will minimize inter-laboratory bias, by making available a robustly calibrated iRM against which (1) measurements of natural samples can be reported, and (2) secondary standards and spikes can be calibrated.

[1] Ibañez-Mejia & Tissot (2019) *Sci. Adv.*, **5**, eaax8648. [2] Inglis et al. (2018) *Chem Geol* **250**, 311-323. [3] Guo et al. (2020) *PNAS* **117** (35), 21125-21131. [4] Tompkins et al. (202) *JAAS* **35**, 1167-1186. [5] Teng et al. (2017) *RiMG* **82**, 1-26. [6] Ibañez-Mejia & Tissot (2018) Goldschmidt IRM pre-conference workshop.