# Sub-nanogram Nd isotope analysis via TIMS: Magic potions, fancy resistors, but don't forget the blank

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Many valuable archives of Earth and solar system history can only be accessed if we can acquire sufficiently prescise $^{143}Nd/^{144}Nd$ isotope measurements on very small (sub-nanogram) quantities of Nd. Recent innovation in this regard has followed two paths. One approach has been activator loading agents that enhance ionization often in concert with NdO+ analysis [1,2]. We have had success with a $Ta_2O_5$ slurry as an activator [1]. With it we have established 16 ppm (2σ) external precision on 4ng loads spanning six years of standard analyses and 10 ppm (2σ) within barrel. Over the past year, we have amassed a standard database from 400 pg loads with external precision currently 40ppm (2σ) and internal precision often below 30ppm. These data are acquired with single filaments, and standard 10^11 ohm resistors. A second approach has been the use of higher ohm resistors, such as 10^12 ohm. When used in concert with NdO+ analysis, similar, or perhaps even better, precision for sub-nanogram Nd loads should also be possible [3].

However, a third important aspect of precise – and accurate – isotope analysis of such small samples (10s to 100s of picograms) is the contribution from blanks. When sample/blank ratios slip below ~100, blank contribution and the daunting challenge of blank correction becomes a signficant – and ultimately the limiting – factor. Full procedural blanks (in preparation for NdO+ analysis) in our lab are generally 3-8 pg of Nd. Still at these levels, loads of less than a few hunded pg of Nd are susceptible to blanks. Recent data [4] from garnets in the Jack Hills metasediments yielded sub-nanogram load sizes as small as 11 pg of Nd. While Sm-Nd isochron geochronology was still successful, deviations of the smallest samples from the isochron clearly relate to blank, rather than analytical limitations. As the community seeks to push into the sub-nanogram range for Nd isotopic analysis, minimizing blanks is at least as important as further innovations in TIMS analysis.

[1] Harvey & Baxter (2009), *Chem Geol* **258**, 251-257 [2] Palacz, Burgess, Inglis (2013) Goldschmidt [3] Trinquier, Bouman, Schweiters (2013) Goldschmdt [4] Eccles *et al* (2013) Fall AGU Meeting.