# A rapid and efficient ion-exchange chromatography for Lu-Hf geochronology and the routine isotope analysis of sub-ng amounts of Hf by MC-ICP-MS

R. BAST*[1], E. E. SCHERER[1], P. SPRUNG[2], M. FISCHER-GÖDDE[3], A. STRACKE[1] AND K. MEZGER[4]

[1]Institut für Mineralogie, Westfälische Wilhelms-Universität Münster, Corrensstr. 24, D-48149 Münster, Germany (*correspondence: Rebecca.Bast@uni-muenster.de)
[2]Institut für Geologie und Mineralogie, Universität zu Köln, Zülpicher Str. 49b, D-50674 Köln, Germany
[3]Institut für Planetologie, Westfälische Wilhelms-Universität Münster, Wilhelm-Klemm-Str. 10, D-48149 Münster
[4]Institut für Geologie, Universität Bern, Baltzerstraße 1+3, CH-3012 Bern, Switzerland

The application of Lu-Hf geochronology has steadily advanced since MC-ICP-MS instruments became widely available. For accurate results, complete chemical separation of both elements is required before analysis because the radioactive parent (and spike isotope) $^{176}$Lu isobarically interferes with $^{176}$Hf. Recent ion-exchange techniques using 1-2 column passes through Ln-Spec resin [e.g., 1] allow high sample throughput, but are limited by an imperfect purification of Hf. This is especially problematic for spiked samples and high-Lu/Hf phases such as phosphate minerals and garnet. By combining components of [1-3], we developed a rapid and efficient ion-exchange chromatography. The method is optimized for low-Hf samples such as mg quantities of garnet (single porphyroblasts or micromilled growth zones) or meteoritic plagioclase and olivine, but is also suitable for up to 100 mg of mafic whole rock.

Isotope analysis are carried out on a Thermo Scientific Neptune Plus MC-ICP-MS equipped with three $10^{12}$ Ω resistors. Stable ion beams are acquired using an Aridus II™ desolvating nebulizer system and a Cetac C-Flow PFA concentric nebulizer at a flow rate of ~80 µl/min. An X-skimmer and Jet sample cone are installed to enhance the sensitivity to ~1800 V/ppm. Replicate analyses of international reference rocks generally yield accurate $^{176}$Hf/$^{177}$Hf that reproduce within 20 ppm for 40 ppb solutions and 50-180 ppm for 1 ppb solutions (e.g., 0.5 ng Hf in 500 µl).

[1] Münker *et al*. (2001) *Geochem Geophys Geosys* **2**, 10.1029/2001GC000183. [2] Patchett & Tatsumoto (1980) *Contrib Mineral Petrol* **75**, 263–267. [3] Wimpenny *et al*. (2013) *Anal Chem* **85**, 11258–11264.