We have made a major breakthrough in the analysis of lithium (Li) isotopes in systems such as marine microfossils (forams) and single crystal mineral grains – systems that are so tiny and have such miniscule amounts of lithium that they were previously thought impossible. This advance will greatly facilitate Li-isotope data collection efforts to trace the evolution of seawater salt composition over geologic time and to understand the processes leading to the evolution of the Earth's crust and mantle after formation of the planet. Our breakthrough is summarized graphically below: micro-column chromatography coupled to ultra-clean techniques allow separation of trace quantities (<0.8 ng) of Li quantitatively from interfering ions, followed by high-sensitivity cold plasma Quad ICP-MS analyses, resulting in 2-SD external precision of better than 1 per mil on samples containing less than 0.8 ng Li.

Chromatographic Separation of Li from Na and Ca: