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# Recent advances in Collision/Reaction Cell applications with the Sapphire Dual Path MC-ICP-MS platform.

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Since the launch of the Sapphire Dual Path Collision/Reaction Cell MC-ICP-MS platform in 2017, the use of a Collision/Reaction Cell to expand and push analytical boundaries has become increasingly popular. First applications include K, Ca, Fe [1], Cu [2], Se, Sr, or U isotopic systems, where collision gases are used to reduce plasma-based interferences or reactive gases such as $O_2$ are used to mass-shift the analyte or isobaric interferences. The reduction of plasma-based interferences thereby allows for measurements in low resolution mode, which, in combination with reduced space charge effects, corresponds to > ten-fold sensitivity increases.

This contribution will provide new insights into different methodological approaches towards quantifying isotope abundance ratios of, e.g., S, Ti, Cr, and Fe, or Ge. Different collision and reaction gases are explored for on-mass or mass shifted isotope ratio measurements to determine the optimal setup for each isotope system. Different sample introduction methods such as wet plasma, dry plasma using a desolvator or laser ablation are used. Preliminary data suggest reproducible and robust measurements for S and Ti isotopes when mass-shifted with $O_2$ to SO and TiO, respectively. On-mass determination for Cr with He-$H_2$-$N_2$, Fe with He-$O_2$, and Ge with He-$N_2$ for polyatomic interference removal are effective approaches to boost sensitivities and quantify previously inaccessible isotope abundances.

[1] Loeb et al. (2023). *arXiv preprint arXiv:2308.15623*.

[2] Lahoud, Moynier Luu, Mahan & Borgne, M. (2024). *Metallomics*, p.mfae008.