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SOLAR SYSTEM MATERIAL GEOCHRONOLOGY BY IN SITU RB-SR ISOTOPIC ANALYSES WITH FEMTOSECOND LASER ABLATION AND THE NEOMA MC-ICPMS/MS

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Amongst the most exciting advances in isotopic analytical techniques is the emergence of collision-reaction cell (CRC) equipped multicollector mass spectrometers. The ability of these instruments to measure isotopic ratios at high precision while reacting the ion beam with gases on-line opens novel possibilities for geochronology and geoforensics [1,2]. This is particularly the case for the Rb-Sr system, as *in situ* measurements are traditionally limited by the ^{87}Rb-^{87}Sr interference, but this can be overcome by on-line fluorination of Sr to SrF isotopologues [3-5]. Over the last decade CRC equipped multicollector instruments have been incrementally realized in the early Proteus prototype [6], then the Vienna instrument [7], culminating in the commercially available Neoma MS/MS and more recently the Nu Sapphire XD. As exciting as the promise of these systems are, their complexity in both hardware and tuning has so far limited their useability.

Here, we introduce a robust methodology for Rb-Sr analyses using a femtosecond laser ablation (fs-LA) system with the Neoma MS/MS. Developed and refined over the past three years, our method builds on lessons learnt from a deep exploration of not only the instrument's large tuning parameter space but also its design and hardware. This includes step-by-step tuning instructions and optimization rationale, supported by the analysis of a suite of reference materials and natural samples. This method dramatically expands the capability for Rb-Sr measurements, is applicable to a wide variety of minerals, and establishes fs-LA-MC-ICPMS/MS as a truly microanalytical technique. At the conference, we will present geo- and cosmochemical applications for this technique including data for select Martian meteorites from all three SNC groups. We will also discuss remaining obstacles, pain points, and the path forward.

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