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In Situ Rb-Sr Dating of Enstatite Chondrites

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Enstatite chondrites (EC) are reduced meteorites which formed in the early inner Solar System [1]. EC are comprised of an unusual mineral assemblage meaning that the application of commonly applied chronometers is challenging. Parent body formation ages determined from relative chronometers (I-Xe, Mn-Cr) are 4.56 Ga [2-4]. Absolute chronometers (Ar-Ar, Rb-Sr) record younger dates (i.e. 4.41-4.53 Ga [5-7]), most likely reflecting metamorphism and impact processes. Some dates, particularly for the EH3, are apparently much younger, ca. 2.1 Ga [7, 8] and are poorly understood. However, interpretation of ages is limited since relatively few EC have been dated by absolute chronometers, e.g. currently fewer than 10 EC have been dated by bulk Rb-Sr techniques.

We analysed a suite of 15 EC (EH3-EH6, EL3, EL6 and impact melts). Samples were characterised via SEM-EDS and EPMA and suitable phases were selected for *in situ* Rb-Sr dating, including the K-bearing (and Rb-rich) sulfide djerfisherite [$(K,Na)_6(Fe,Cu,Ni)_{25}S_{26}Cl$)] (only present in the EH3), chondrule mesostasis (albitic glass), feldspar and enstatite. *In situ* Rb-Sr dating was performed using an Agilent 8900 triple quadrupole ICP-MS coupled to a Teledyne Analyte excite excimer laser [9]. In most samples, excluding djerfisherite-bearing EH3, target phases have low Rb abundances, making dating challenging. Initial results indicate that dates of ~4.5 Ga are attainable but with fairly large uncertainties of 0.1-0.4 Ga, caused by a limited spread of Rb/Sr ratios. The presence of djerfisherite with high Rb/Sr ratios in the EH3 samples helps reduce this uncertainty and is the focus of further analysis.

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