Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.34601

Rb–Sr systematics of the Chang'e-5 basalt inferred by in-situ analysis

MAX HELLERS[1], FRANK WOMBACHER[1], MR. THOMAS ZACK[2], MARIO FISCHER-GÖDDE[1], NIKLAS KALLNIK[1], JOSUA J PAKULLA[1], DR. CHUN-HUI LI[3] AND CARSTEN MÜNKER[1]

[1]University of Cologne
[2]University of Gothenburg
[3]Chengdu University of Technology

The Chang'e-5 spacecraft returned the youngest known igneous rocks from the Moon to Earth [e.g., 1,2,3,4]. The discovery of lunar volcanism younger than 3.0 Ga requires revision of our understanding of how long volcanism was feasible on the Moon. Chang'e-5 basalt samples have been dated extensively using Pb–Pb geochronology, yielding a crystallisation age of 2031.1 ± 3.8 Ma [3, and references therein]. However, similar chronological information from other isotope systems has so far been lacking. Here, we provide in-situ radiogenic Sr isotope data of plagioclase from a subophitic basalt clast from Chang'e-5, analysed with a 193 nm ESI Excimer laser connected to a Thermo Fisher Scientific Neoma MC-ICP-MS/MS operated without reaction gases. We report a mean initial $^{87}Sr/^{86}Sr$ isotope ratio of 0.69966 ± 0.00019 (N=9, 2 s.e.) and low $^{87}Rb/^{86}Sr$ ratios <0.002. Combining our data with plagioclase and bulk rock Rb–Sr data from the literature [2,4,5,6], yields an isochron age of 1920 ± 13 Ma, significantly younger than the Pb–Pb ages. As magma emplacement was likely over a short time interval [3], the ~100 Myr difference between Pb–Pb ages and our Rb–Sr isochron age is unlikely to be related to open-system behaviour of the Rb–Sr system during prolonged magmatic heating of the basaltic pile. Impact-induced heating of the Chang'e-5 proto-basalt may represent a more likely mechanism being capable of resetting the Rb–Sr system. Hence, the Rb–Sr system provides new insights into the chronology of post-emplacement events at the Chang'e-5 site.

[1] Li et al. (2021) Nature 600, 54-58
[2] Tian et al. (2021) Nature 600, 59-63
[3] Hao et al. (2024) Lithos 107495, 1-7
[4] Shen et al. (2025) GPL 33, 44-50
[5] Li et al. (2023) Sci. Bull. 68, 2724-2728
[6] Zhang et al. (2024) Icarus 413, 116002, 1-10