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Triple oxygen isotope comparison between terrestrial and lunar rocks - implications for the lunar formation

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The Moon formed from the debris of a catastrophic collision between the proto-Earth and a giant impactor called Theia (giant impact hypothesis, GIH). Theia is expected to have a triple oxygen isotope composition ($\Delta'^{17}O$) distinct from the proto-Earth due to the large isotopic heterogeneities in the solar system. The GIH implies that the Moon accreted a higher portion of Theia than Earth, therefore the Moon should also differ in its $\Delta'^{17}O$ from Earth.
The $\Delta'^{17}O$ of the Moon vs. Earth was investigated in several studies [1-7] leading to different results. We reassess the composition of lunar rocks in comparison to terrestrial rocks by means of improved high-precision BrF_5 laser fluorination $^{18}O/^{16}O$ and $^{17}O/^{16}O$ measurements.

[1] Wiechert et al. (2001) Science 294, 345–348 [2] Spicuzza et al. (2007) Earth Planet. Sci. Lett. 253, 254–265 [3] Hallis et al. (2010) Geochim. Cosmochim. Acta 74, 6885–6899 [4] Herwartz et al. (2014) Science 344, 1146–1150 [5] Young et al. (2016) Science 351, 493–496 [6] Greenwood et al. (2018) Sci. Adv. 4, 1–8 [7] Cano et al. (2019) Lunar Planet. Sci. Conf. 50, abstract #2132

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