Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36118

AGE, GEOCHEMISTRY AND MINERALOGY OF LUNAR METEORITE NWA 15352: IMPLICATIONS FOR ITS ORIGIN

DOVYDAS ARANAUSKAS[1,2], **GRAZINA SKRIDLAITE**[3], CÉCILE DELIGNY[4], MARTIN J. WHITEHOUSE[5], DR. RENAUD E. MERLE, PHD[6] AND LAURYNAS SILIAUSKAS[3]

[1]Geological Survey of Lithuania
[2]Vilnius University
[3]State Scientific Research Institute Nature Research Centre
[4]Université de Lorraine-CRPG-CNRS
[5]Swedish Museum of Natural History
[6]Uppsala University

Lunar meteorites preserve information about the composition of lunar rocks and geological processes affecting the Moon from the early time of the Solar system. Moreover, they provide a broader view on the Moon's composition, since they come from random locations of the lunar surface. A geochemical study including Pb-Pb isotope dating was carried out on NWA 15352 lunar feldspathic breccia. The studied sample consists of mineral fragments and rock clasts embedded in a melt matrix. The dominant minerals are Ca-rich plagioclase, olivine, pyroxenes, ilmenite and sulfides with a minor abundance of spinel, FeNi metals, late phase zircon, phosphates and K-rich glass. Anorthosite, basalt, breccia and melt clasts were identified. This latter observation together with the numerous fractures on the mineral surfaces, angular shape of minerals and partially melted clasts indicate multiple, impact-related, shock events that mixed, crushed, and remelted different lithologies of lunar material which are eventually present in the NWA 15352 sample. This suggests a complex chemical composition of the breccia-forming elements and history. The high anorthite (>An90) content in plagioclase reveals that some clasts were likely to originate from the lunar highlands while the presence of Mg-rich spinel fragments may indicate that the material was excavated from the lunar upper mantle through a large impact event [4]. The Pb-Pb dating yielded a 3846 ± 44 Ma (2S) crystallization age of the lunar basalt clast. Our new Pb-Pb age overlaps within uncertainties the ages of the Apollo 11 basalts10003 [1], group B2 Hi-Ti basalts, those of Apollo 15 KREEP basalts (sample 15386) [2] and Yamato-Asuka-Miller Range basalts [3].

References

[1] Snape, Nemchin, Whitehouse, Merle, Hopkinson and Anand (2019). Geochimica et Cosmochimica Acta, 266, 29–53. https://doi.org/10.1016/j.gca.2019.07.042.

[2] Snape, Nemchin, Bellucci, Whitehouse, Tartèse, Barnes, Anand, Crawford and Joy (2016). Earth and Planetary Science Letters, 451, 149–158. https://doi.org/10.1016/j.epsl.2016.07.026.

[3] Merle, Nemchin, Whitehouse, Kenny and Snape (2024). Journal of Petrology, 65 (6), egae062, https://doi.org/10.1093/petrology/egae062

[4] Wittmann, Korotev, Jolliff and Carpenter (2019). Meteoritics & Planetary Science, 54(2), 379–394. https://doi.org/10.1111/maps.13217