Crystallization of the Lunar Magma Ocean


The Moon formed from a high Sm/Nd terrestrial mantle prior to 4.45 Ga. The LMO completely crystallized by ~ 4.44 Ga, and the sources of the high-Mg crustal rocks, KREEP and perhaps the low-Ti basalts were present in the lunar interior. Boyet & Carlson (2007) A highly depleted moon or a non-magma ocean origin for the lunar crust? EPSL 262, 505-516.
Crystallization of the Lunar Magma Ocean

FAN age (60025) of 4,360 +/- 3 million years requires that either the Moon solidified significantly later than most previous estimates or the long-held assumption that FANs are flotation cumulates of a primordial magma ocean is incorrect.

Borg L.E. et al. (2011) Chronological evidence that the Moon is either young or did not have a global magma ocean. *Nature* **477**, 70-72.

The $^{176}$Lu–$^{176}$Hf urKREEP model age = 4353 ± 37 Ma, which is concordant with the re-calculated Sm–Nd urKREEP model age of 4389 ± 45 Ma. The average of these ages, 4368 ± 29 Ma, represents the time at which urKREEP formed.

Modeling of Magma Ocean Crystallization

New modeling techniques and approaches to the crystallization of the lunar magma ocean.

Elkins-Tanton et al. (2002) Re-examination of the lunar magma ocean cumulate overturn hypothesis: melting or mixing is required. *EPSL* 196, 239-249.


Namur et al. (2011) Anorthosite formation by plagioclase flotation in ferrobasalt and implications for the lunar crust. *GCA* 75, 4998-5018.