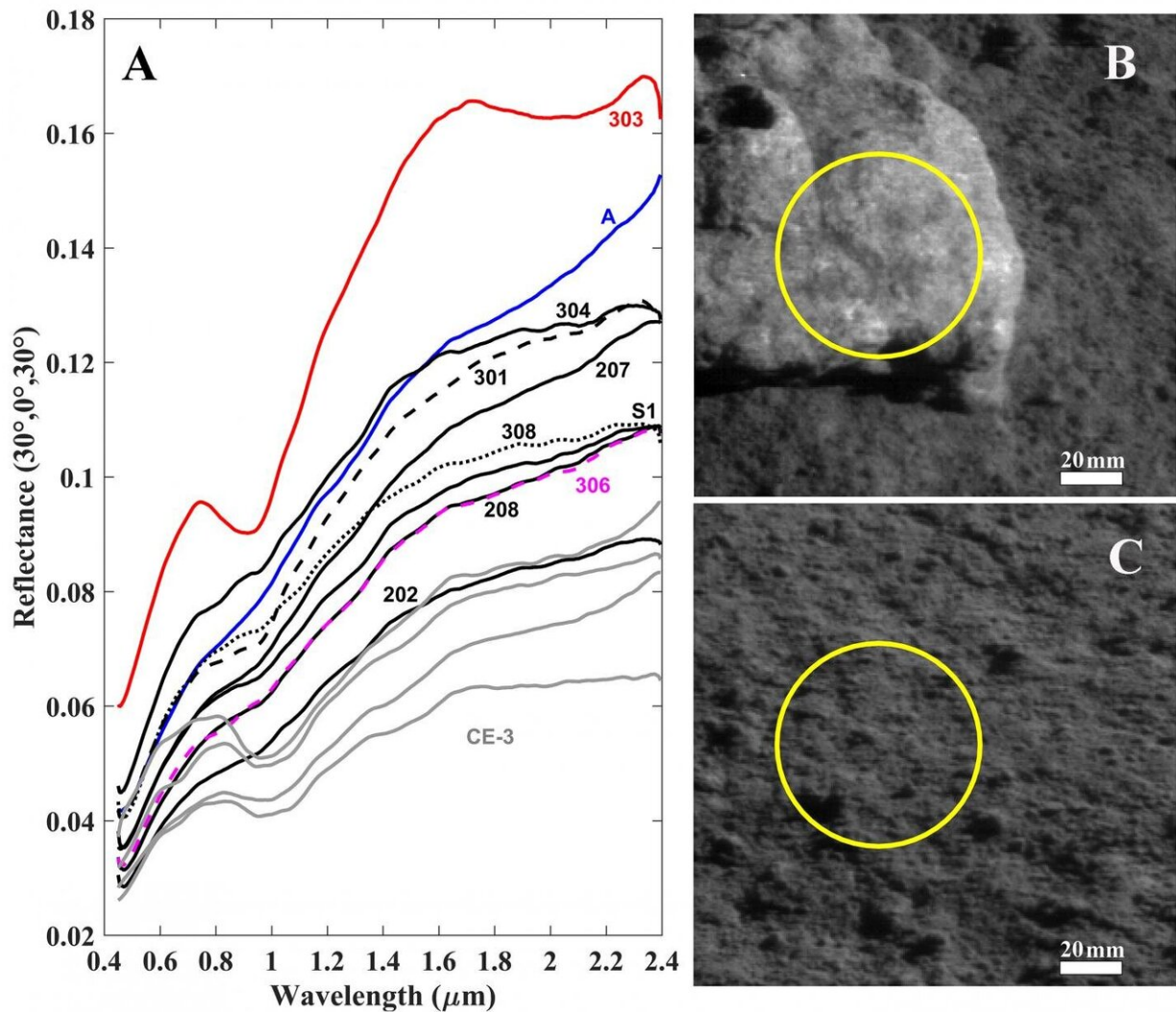


Olivine-norite rock detected by Yutu-2 likely crystallized from the SPA impact melt pool

November 19 2019



VNIS spectra of the rock and lunar regolith measured by Yutu-2 rover. The image resolution is ~ 0.6 mm/pixel. Credit: Science China Press

The South Pole-Aitken (SPA) is the largest and deepest basin on the Moon, theoretically opening a window into the lunar lower crust and likely into the upper mantle. However, compositional information of the SPA basin was mainly obtained from orbital remote sensing. Chang'E-4 landed in the SPA Basin, providing a unique chance for in situ probing the composition of the lunar interior. The landing site is located on ejecta strips radiating from Finsen crater, which lies ~135 km to the northeast. The lunar surface at the landing site consists of a very homogenous regolith overlain by few scattered rocks.

A surface rock and the [lunar regolith](#) at 10 sites along the rover Yutu-2 track were measured by the onboard Visible and Near-Infrared Imaging Spectrometer in the first three lunar days of mission operations. In-situ spectra of the regolith have peak band positions at 1 and 2 μm , similar to the spectral data of Finsen materials from the Moon Mineralogy Mapper, which confirms that the regolith's composition of the landing area is mostly similar to that of Finsen ejecta. The estimated modal composition of the lunar regolith is dominated by agglutinates, plagioclase and pyroxenes with more low-calcium than high-calcium, inconsistent with mare basalts. Thus, the surface materials at the [landing site](#) are predominantly ejecta from neighboring craters, with little contribution from the underlying mare basalt. Our observations are also supported by topographic features.

The rock spectrum shows similar band peak positions, but stronger absorptions, suggesting relatively fresh exposure. This rock is likely representative of the original bedrock in the Mg-Pyroxene Annulus of SPA basin. This rock is >20 cm in size, sitting on the [regolith](#) surface. No grains can be unambiguously recognized on the surface based on the image with spatial resolution of 0.6mm/pixel, suggesting a fine- or medium-grain-size texture (

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