

Phyllosilicate minerals in comet P/2016 BA14 (PANSTARRS)

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Comets are thought to contain pristine materials formed in the early solar nebula. In periodic comets that have orbited the Sun many times, compared to dynamically new comets, with progressively smaller perihelion distances, the nucleus exhibits clues to investigate significant physical and chemical evolution, including the influence of solar heating on cometary nuclei. Thus, conducting observational and theoretical studies on evolved comets is essential. The evolutionary track of exceedingly weakly active comets is considered to lead up to their dormancy or extinction.

Here, we report on the mid-infrared imaging and spectroscopic observations of comet P/2016 BA14 (PANSTARRS). Its gas and dust production rates were notably low, even near the perihelion passage around 1 au from the Sun. We observed the comet P/2016 BA14 on UT 2016 March 21.3 at heliocentric and geocentric distances of 1.01 au and 0.026 au, respectively, approximately 30 hours before its closest approach to Earth (0.025 au). Low-resolution ($R \sim 250$) spectroscopic observations in the *N*-band and imaging observations centered at 8.8, 12.4, 17.7, and 18.8 microns were carried out using the Cooled Mid-Infrared Camera and Spectrometer (COMICS) mounted on the 8.2m Subaru telescope. The observed image of the comet has a spatial profile that is consistent with a point-spread function.

The normalized emissivity spectrum of the comet exhibits abrupt-like features around 10 microns. The features are not reproduced by the anhydrous silicate minerals typically found in cometary coma dust, such as olivine and pyroxene. By comparing with the thermal emissivity spectra measured for various minerals in the laboratory, the shape and position of the observed ~ 10 -micron feature observed for P/2016 BA14 are more similar to those of phyllosilicates rather than anhydrous silicates, which are usually not observed in the mid-infrared comet spectra.

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