

Q35a Near-IR spectroscopy of massive young stellar object toward the direction of the Galactic center: XCN and aromatic C-D features

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We report near-infrared (2.5–5 μm) long-slit ($\sim 30''$) spectroscopy of a young stellar object in the direction toward the Galactic center with the Infrared Camera on board the AKARI satellite. The present target is suggested to be AFGL 2006 based on its very red color and close location. The spectra show strong absorption features of H₂O and CO₂ ices, and emission of H I Br α recombination line and the 3.3 μm band, the latter of which is attributable to polycyclic aromatic hydrocarbons (PAHs) or materials containing PAHs. The spectra show a broad, complex absorption feature at 4.65 μm , which is well explained by a combination of absorption features of CO ice, CO gas, and XCN, and H I Pf β emission. The spectra also indicate excess emission at 4.4 μm . The characteristics of the spectra suggest that the object is a massive young stellar object. The XCN feature shows a good correlation with the Br α emission, suggesting that the photolysis by ultraviolet photons plays an important role in the formation of the XCN carriers, part of which are attributed to OCN⁻. The 4.4 μm emission shows a good correlation with the 3.3 μm PAH emission, providing supporting evidence for the first time that it comes from the aromatic C–D stretching vibration, which has been elusive in the past search. The formation of OCN⁻ is of importance for the formation process of prebiotic matter in the interstellar medium (ISM), while the detection of aromatic C–D emission provides valuable information on the deuteration process of PAHs in the ISM and implications on the hiding site of the missing deuterium in the ISM.