

AKARI observations of ice absorption bands towards edge-on YSOs

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Circumstellar disks and envelopes of low-mass young stellar objects (YSOs) contain significant amount of ice. Such icy material will evolve to be volatile components of planetary systems, such as comets in our solar system. In order to investigate the composition and evolution of circumstellar ice of low-mass YSOs, we have observed ice absorption bands at near infrared (NIR) towards 8 YSOs ranging from class 0 to class II, among which 7 are associated with edge-on disks.

Slit-less spectroscopic observations are performed using grism mode of Infrared Camera (IRC) on board AKARI, which enables us to obtain full NIR spectra from 2.5 μm to 5 μm , including the CO₂ band and blue wing of the H₂O band, which are not accessible from the ground. We developed procedures to reduce the spectra of targets with nebulosity. The spectra are fitted by the polynomial to derive the absorption spectrum, which then is fitted by the laboratory database of ice absorption bands considering the instrumental line profile and spectrum resolution of the grism.

Towards the Class 0-I sources, absorption bands of H₂O, CO₂, CO and XCN are clearly detected. Column density ratios of CO₂ ice and CO ice relative to H₂O ice are 15-28 % and 13-46 %, respectively. If XCN is OCN⁻, its column density is as high as 2-6 % relative to H₂O ice. Weak features of ¹³CO₂, HDO, C-H band, and gaseous CO are detected as well. OCS ice absorption is detected towards IRC-L1041-2. Towards class II stars, H₂O ice band is detected. We also detected H₂O ice, CO₂ ice and tentative CO gas features of the foreground component of class II stars.

