Interstellar ices as revealed by AKARI near-infrared spectroscopy

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The near-infrared (NIR) spectral region (2–5μm) contains a number of ice features, such as H_2O ice at 3.05μm, CO_2 ice at 4.27 μm, and CO ice at 4.67 μm, and XCN ice at around 4.62μm. The Infrared Camera (IRC) onboard AKARI has a NIR spectroscopic capability with high sensitivity for extended sources that allows us to study these major ice components in various diffuse Galactic objects for the first time (Onaka et al. 2007; 2010). In particular, H_2O and CO_2 ice absorption features have been detected towards a number of HII region-PDR complexes in observations with the IRC during the warm phase (Mori et al. 2014). The IRC spectra show a weak correlation between the column densities of CO_2 and H_2O ices. The ratio of the CO_2 to H_2O ice column densities is in a range 0.1–0.2, which is in agreement with previous observations towards massive young stars (Pontoppidan et al. 2008). The correlation supports the concurrent formation of both ice species on the grain surface (Oba et al. 2010). Both ice species also show a weak trend with Av with a threshold for the presence at Av~5, which is also in agreement with previous results towards the Taurus cloud (Whittet et al. 2001, 2007). These results suggest the presence of common physical conditions for the ice formation in general interstellar clouds. In this presentation, we will show the results of recent analysis of AKARI IRC NIR spectroscopy of ice species.

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