Effect of Galactic Environment on the Properties of Ices around Embedded Young Stellar Objects

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The most important reservoir of heavy elements in the interstellar space is, of course, cosmic dust. But if we look at dense and cold regions such as a circumstellar environment of embedded young stellar objects (YSOs), it is believed that the significant amount of heavy elements exists as ices (e.g., [1]). Ices are thought to be formed by chemical reactions which proceed on the surface of dust, and thus understanding the properties of ices is important for the understanding of the formation and evolution of cosmic dust in the universe.

Observations of ices around extragalactic YSOs are one of the challenging topics in the current ice studies. It is highly probable that different galactic environments (e.g., metallicity, radiation field, etc.) could affect the chemical properties of circumstellar materials. The Large and Small Magellanic Clouds (LMC and SMC) are the nearest metal-poor galaxies to our Galaxy. Observations of YSOs in the Magellanic Clouds allow us to investigate how the properties of circumstellar materials of YSOs vary in the different galactic environments.

In the previous AOGS 2010, we reported the systematic difference in the molecular abundance of ices around YSOs in the LMC and in our Galaxy based on the spectroscopic observations of LMC's YSOs [2]. In this presentation, we will report the observations of YSOs in the Small Magellanic Cloud, whose metallicity is lower than the LMC. We detected the absorption features of major solid molecules like water and carbon dioxide toward the SMC's YSOs with the infrared satellite AKARI. Based on these results, we are going to discuss how chemical properties of ices around embedded YSOs vary in the three different galactic environments, i.e., our Galaxy, LMC and SMC.

References

[1] A. C. A. Boogert and P. Ehrenfreund, ASP Conf. Series, Vol.309, (2004)
[2] T. Shimonishi et al., A&A, 514, A12, (2010)