

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

©2011. Japan Geoscience Union. All Rights Reserved.



PPS025-09

Room:101

Time:May 23 16:30-16:45

Grain-surface reactions: chemical evolution and deuterium fractionation in molecular clouds

Naoki Watanabe^{1*}, Hiroshi Hidaka¹, Yasuhiro Oba¹, Tetsuya Hama¹, Akira Kouchi¹, Takeshi Chigai¹, Yuki Kimura²

¹Inst. Low Temp. Sci., Hokkaido Univ., ²Tohoku Univ.

Surface processes on interstellar icy grains play an important role in chemical evolution in molecular clouds. Until now, there have been many experimental works which report the synthesis of many molecules by energetic processes, such as UV, electron and ion bombardments, in interstellar ice analogues. Even formation of amino acid was observed after such energetic processes in ices. However, in dense core of molecular cloud where the radiation field is very weak, since the energetic processes are relatively suppressed, nonenergetic processes like neutral-neutral surface reactions become important. In this context, our group has performed a series of experiments regarding surface reactions of cold H(D)-atoms and OH radical with molecules to produce H₂O, CO₂, H₂CO, and CH₃OH. We have also tackled an important issue, deuterium fractionation of molecules in molecular clouds and demonstrated for the first time that tunneling surface reaction on interstellar ice is the key for the deuterium enrichment of some organic molecules. In the presentation, we will review our series of works described above and talk briefly about the very recent experiment for H-atom diffusion on the ice surface.