THE SEARCH FOR COMPLEX ORGANIC MOLECULES DESORBING FROM INTERSTELLAR ICE ANALOGS: PRESENTING SubLIME2

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Dark and cold regions in space, including regions like prestellar cores and protoplanetary disks, have been shown to harbor high densities of complex organic molecules. Many organic molecules can form in interstellar ices and be deposited into the gas phase via heating, shocks, or other desorption mechanisms. Nonetheless, the expectation is that the density of large organics in cold, dark regions should be low because the molecules readily freeze out onto ices during collisions. Therefore, there is a debate about how molecules like methanol can be detected in the gas phase in regions where they should be depleted on the surface of dust particles. We have developed a new experimental technique, Sublimation Laboratory Ice Millimeter/submillimeter Experiment (SubLIME), to study these processes. We will present the latest experimental findings using SubLIME2, the newest ultra-high vacuum setup focused on detecting complex organics from interstellar ice analogs studied at cryogenic temperatures. With these experiments, we perform FTIR spectroscopy in the mid-IR to monitor solid-phase molecules, mass spectrometry to detect the molecules in the gas phase, and millimeter/submillimeter rotational spectroscopy from 100 to 1000 GHz to look for complex molecules desorbing from the solid to the gas phase. Here we will report on our recent experiments to study photolysis and photodesorption of simple ices containing water, methanol, and carbon monoxide.