Laboratory simulation on EUV photolysis of inorganic interstellar ice analogues

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In this report we focused on the formation of large organic molecules from most simple cosmic inorganic ice analogues consisting of H_2O, CO_2 and NH_3 irradiated by extreme ultraviolet (EUV) photons. We employed an ultra-high vacuum chamber equipped with a closed- cycle helium cryostat to simulate the environment of the space beyond the atmosphere. The necessary intense simulation of solar radiation is provided by a synchrotron beam in the wide 4 – 20eV range at National Synchrotron Radiation Research Center in Hsinchu, Taiwan. After exposure to 10^{20} photon dose, the icy sample was warmed up to room temperature under dynamic vacuum, then we deposited another icy sample as well as last one and EUV irradiated and warmed up to room temperature again and again for six times, the KBr substrate was then removed in an environment filled with argon gas. After removed into laboratory, the sample was washed with distilled water and hydrolyzed in a standard procedure, the residue was then analyzed by HPLC. The result shows that we could clearly identify 8 amino acids, such as glycineąBanalineąBserine. . . etc. which were left over in the residue. Associated with those basic amino acids are several other large molecules that could be tentatively identified as basic organic materials evolved from photolysis process.