

# **EUV-UV Photon-Induced Chemical Reactions in Mixed Ices System at 10 K**

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Experimental results on the spectral identification of new IR absorption features produced through EUV-UV photon-induced chemical reactions in the cometary-type ices and icy satellites of planetary systems are obtained. We have carried out such measurements on H<sub>2</sub>O-CH<sub>4</sub> mixed ices, H<sub>2</sub>O-C<sub>2</sub>H<sub>2</sub> mixed ices, CO<sub>2</sub>-H<sub>2</sub>O mixed ices as well as the pure C<sub>2</sub>H<sub>2</sub> ices. A tunable intense synchrotron radiation light source available at the Synchrotron Radiation Research Center, Hsinchu, Taiwan, was employed to provide the required EUV-VUV photons. In this study the photon wavelengths used to irradiate the icy samples were selected to center at the prominent solar lines, namely, the 121.6 nm, 58.4 nm, and 30.4 nm. New molecular species were produced in the ice samples as a result of EUV-VUV photon irradiation at 10 K. The new molecules identified were mainly C<sub>2</sub>H<sub>6</sub>, CO<sub>2</sub>, CO, CH<sub>3</sub>OH, and H<sub>2</sub>CO. In addition, we have tentatively assigned several unidentified absorption features to HCO, C<sub>3</sub>H<sub>8</sub> and C<sub>2</sub>H<sub>5</sub>OH. However, further study is warranted. While new molecular species were formed, the original reactants, namely, H<sub>2</sub>O, CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, and CO<sub>2</sub>, were depleted due to their conversion to other species. The detailed results of this work will be presented.