Dalian Coherent Light Source reveals strong isotope effects in photodissociation of water isotopologue
23 July 2021

Dalian Coherent Light Source revealing strong isotope effects in water photochemistry. Credit: DICP

Recently, a research group led by Prof. Yuan Kaijun and Prof. Yang Xueming from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences revealed strong isotope effects in photodissociation of the water isotopologue (HOD) using the Dalian Coherent Light Source.

Their findings were published in Science Advances on July 23.

"Our experimental results illustrate dramatically different quantum state population distributions of OH and OD fragments from HOD photodissociation. The branching ratios of the H"OD and D"OH channels display large wavelength-dependent isotopic fractionation," said Prof. Yuan.

Because water is one of the most abundant species in the solar nebula, photodissociation of water and its isotopologue by solar vacuum ultraviolet photons may be an alternative source of the D/H isotope heterogeneity, and this effect must be considered in photochemical models.

The photochemical processes identified in this work may vary the D/H isotopic ratios in the inner and outer regions, and/or in different periods of the solar nebula, which may cause the D/H isotope heterogeneity in the solar system.


Provided by Chinese Academy of Sciences