ELECTRONIC SPECTROSCOPY OF VUV IRRADIATED PAH CONTAINING INTERSTELLAR WATER ICE

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Polycyclic aromatic hydrocarbons (PAHs) are believed to be present in space and to play a key role in inter- and circumstellar reaction schemes. Their presence is evidenced by characteristic infrared emission features following UV excitation, but unambiguous identifications have not been possible mainly because of spectral congestion and overlap. Here we present a new laboratory experiment that provides optical fingerprint spectra of PAHs in water ice. As the technique is fast - with a subsecond time resolution - also reactions in the ice following energetic processing can be monitored at astrophysically relevant temperatures (10 to 300 K). For this, the ice is irradiated with a special VUV source that produces Lyman-α radiation to simulate the interstellar radiation field. Spectral changes show that PAH-ions and reaction products involving dissociation products from the water matrix (PAH-OH and its ions) are readily formed. The technique is demonstrated on the example of pyrene ($C_{16}H_{10}$) in water ice.