PHOTOINDUCED CHEMISTRY WITHIN COLD CORONENE CLUSTERS IN THE GAS PHASE

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Free cold pure coronene clusters containing up to 13 coronene molecules, i.e. 312 carbon atoms, have been formed in a gas aggregation source. When these clusters were irradiated with excimer laser pulses at $h\nu$ = 4 eV, we observed a rich photo-induced chemistry leading to the formation of new covalently bound species, whose size is larger than the initial coronene units, thus contributing to the PAH growth.

The analysis of the photoproducts thanks to a reflectron time-of-flight mass spectrometer has shown that photo-initiated intracluster reactions take place, leading to ionic species which may include Polycyclic Aromatic Hydrocarbons (PAHs) larger than coronene, PAH-coronene clusters, as well as coronene clusters branched with unsaturated aliphatic chains. The relevance of these results in the context of the interstellar medium chemistry, and in particular the carriers of the so-called aromatic infrared emission bands (AIBs) is discussed. Such photoinduced chemistry taking place at the boundaries of molecular clouds may provide a route to the hydrocarbonated nanograins which are thought to be responsible for these bands.

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