CAVITY RINGDOWN SPECTROSCOPY OF DISSOCIATED NAPHTHALENE IN A RADIOFREQUENCY PLASMA JET

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Polycyclic aromatic hydrocarbons (PAHs) are abundant organic molecules detected in several objects in the universe, such as molecular clouds in the interstellar medium (ISM)[1]. Their structure can be modified through plasma-driven processes occurring in the ISM. The present study focuses on the dissociation of naphthalene ($C_{10}H_8$) in a radiofrequency (RF) plasma, probed using cavity ringdown spectroscopy (CRDS) in the near-infrared. Namely, the low-power RF plasma source, called Platypus, is adapted from a small plasma thruster (Pocket Rocket[2]) designed by the Space Plasma Power and Propulsion laboratory of the ANU. A stable supersonic jet plasma is generated by expanding a mixture of argon and $C_{10}H_8$ into a vacuum chamber through a 20 mm long, 4 mm wide slit nozzle[3]. The jet-cooled fragmented $C_{10}H_8$ is finally probed with the ultra-sensitive CRDS technique. We recorded a spectrum from 5950 to 6120 cm^{-1} composed of several hundred transitions originating from many different molecules, radicals, and probably ions[4].

[1] doi:10.1086/184435, L. J. Allamandola *et al.*, The Astrophysical Journal, 290, L25-L28 (1985).

[2] doi:10.1088/0963-0252/21/2/022002, C. Charles and R. W. Boswell, Plasma Sources Science and Technology, 21.2, 022002 (2012).

[3] theses.hal.science/tel-03341145, E. Dudás, Ph.D Thesis, 149-162 (2021).

[4] doi:10.1021/acs.jpca.9b00100, M. Alliati *et al.*, The Journal of Physical Chemistry, A 123.10, 2107-2113 (2019).

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