MICROWAVE AND LASER SPECTROSCOPIC STUDIES OF CARBON-CHAIN FREE RADICALS

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Spectroscopy of long carbon-chain molecules has been attracting much attention in recent years, since various carbon-chain molecules have been detected in interstellar space by radio- telescopes and are also considered to be possible sources of Diffuse Interstellar Bands. So far, we have applied FTMW spectroscopy to the studies of various short lived free radicals including carbon-chain molecules. Use of a supersonic jet expansion technique, combined with a pulsed discharge nozzle consisting of two electrodes attatched in front of a pulsed valve, has been proved to be a powerful method for studies of short lived species, partilucarly those with long carbon-chains, since the method effciently produces short lived species in the discharge and the jet cooling of the products greatly simplifies the spectra to be observed.

Quite recently, we have successfully applied the pulsed nozzle system to laser spectroscopy in the visible and near UV regions, where various techniques including LIF, SEP, and newly developed MODR are used to elucidate detailed behaviour of electronically and/or vibrationally excited states of carbon-chain molecules. Studies of excited states are considered to have particular importance, since spectroscopic data for long carbon-chain molecules are rather limited to those in the ground electronic/vibrational states, while they are expected to show various interesting vibronic interactions.

In the present talk, we will present recent results obtained by using FTMW spectroscopy and laser spectroscopy in the visible and near UV regions.