INFRARED SPECTROSCOPIC STUDY OF CARBON CLUSTERS TRAPPED IN SOLID PARAHYDROGEN

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Recently solid parahydrogen is shown to be a promising medium for matrix-isolation spectroscopy.[a] Availing of several salient features of the new matrix, we are studying molecules of chemical interest such as free radicals. In the present work, we report infrared spectra of small carbon clusters trapped in solid parahydrogen.
Carbon clusters were produced by laser vaporization of a carbon rod placed inside the optical cell. The second harmonic of a Q-switched Nd:YLF laser was used for ablation. The observed infrared spectrum showed the presence of small carbon clusters such as C_3, C_5 and C_9 in a parahydrogen crystal at 4.8K. A detailed analysis of the spectrum reveals that these clusters are not rotating freely but are strongly hindered by surrounding hydrogen molecules.

[a]T. Oka *Anu. Rev. Phys. Chem.*, **44**, 299 (1993); D. P. Weliky, T. J. Byers, K. E. Kerr, T. Momose, R. M. Dickson, and T. Oka, *Appl. Phys.* **B59**, 265 (1994).