DOPPLER-FREE HIGH RESOLUTION SPECTRAL ATLAS OF IODINE MOLECULE 15,000 TO 19,000 CM^{-1}

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A new accurate spectral atlas with the Doppler-free spectrum of I_2 from 15,000 to 19,000 cm^{-1} has been made up. Hyperfine lines were resolved using Doppler-free saturation spectroscopy with a single-mode ring dye laser (Coherent 899-29). The spectrum has been recorded together with frequency marks of an etalon. The cavity length of the etalon was stabilized by YAG laser light of which the frequency was locked to a certain hyperfine line of I_2. These frequency marks were calibrated with the precise transition wavenumbers of several standard lines. The absolute transition wavenumber of each observed hyperfine line can be determined by comparing the spectrum and the frequency marks in this atlas. The error is less than 0.00015 cm^{-1}, which is exceedingly better than the current atlas with the Doppler-limited spectrum.[a]

The new atlas is essential for modern ultrahigh resolution molecular spectroscopy. The accurate transition wavenumbers of the spectral lines are important not only to obtain the accurate molecular constants but also to analyze the energy shifts by perturbation which induces excited state dynamics such as predissociation, intersystem crossing, intramolecular vibrational redistribution, and so on. This new atlas is now in press and will be released soon with the CD-ROM data.[b]

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[a] S. Gerstenkorn and P. Luc, Atlas du Spectre d'Absorption de la Molécule d'Iode entre 14800-20000 cm^{-1}, CNRS, Paris, 1978.

[b] This work was promoted by the propulsive committee of Photoscience :Research for the Future of Japan Society for the Promotion of Science (JSPS).