ROTATIONAL SPECTROSCOPY OF SINGLE CARBONYL SULFIDE MOLECULES EMBEDDED IN SUPERFLUID HELIUM NANODROPLETS

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The pure rotation spectrum of carbonyl sulfide embedded in superfluid helium nanodroplets was measured in the frequency range from 4 to 15.5 GHz. Four lines, corresponding to the J = 1-0, J = 2-1, J = 3-2, and J = 4-3 transitions were found. The line widths increase with J, and are about twice that of the corresponding rovibrational lines[a], indicating faster rotational relaxation within the ground vibrational manifold. The comparison of the pure rotational spectrum with the microwave-infrared double resonance spectrum[b] reveals that the double resonance measurement mainly probes rotational transitions within the upper vibrational manifold.

[a] S. Grebenev, M. Hartmann, M. Havenith, B. Sartakov, J. P. Toennies, and A. F. Vilesov, *J. Chem. Phys.*, **112**, 4485 (2000).
[b] S. Grebenev, M. Havenith, F. Madeja, J. P. Toennies, and A. F. Vilesov, *J. Chem. Phys.*, **113**, 9060 (2000).