TRANSIENT FREQUENCY ABSORPTION STUDIES OF MOLECULES PRODUCED IN A LASER ABLATION - SUPERSONIC EXPANSION SOURCE

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The supersonic free jet expansion of a laser ablation/reaction source has been coupled to sensitive transient frequency modulation absorption spectroscopy[1,2] for the first time. The (0,0)$A^1\Sigma - X^1\Sigma$ band system (ν= 12643 cm^{-1}) of PtC and the (0,0) $C^3\Delta - D^3\Delta$ band system of TiS (ν= 12065 cm^{-1}) were recorded. Excellent S/N could be achieved using a single pass through the expansion 5 cm from the ablation source. Narrow spectral features($<$ 200 MHz) were achieved by appropriate temporal gating of the transient signal. The observed absorption lineshapes exhibit a dependence on the intrinsic transition moment and therefore the probe laser power, which facilitated the assignment of the optical spectrum.

[1] J.C. Bloch, R.W. Field, G.E. Hall and T.J. Sears, J. Chem. Phys. 101, 1717 (1994).
[2] A.J. Marr, T.J. Sears, B-C Chang, J. Chem. Phys. 109, 3431 (1998).

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