TIME-RESOLVED FT INTRACAVITY SPECTROSCOPY WITH SEMICONDUCTOR LASERS.

FATOU GUEYE, VÉRONIQUE GIRARD, GUY GUELACHVILI, NATHALIE PICQUÉ, *Laboratoire de Photophysique Moléculaire, Unité Propre du CNRS, Université de Paris-Sud, Bâtiment 350, 91405 Orsay-Cedex, France. (email: guy.guelachvili@ppm.u-psud.fr nathalie.picque@ppm.u-psud.fr)*; VICTOR DANA, JEAN-YVES MANDIN, *Laboratoire de Physique Moléculaire et Applications, CNRS, case courrier 76, Université Pierre-et-Marie-Curie, 75252 Paris Cedex 05, France*.

Intracavity laser spectroscopy (ICLAS) is recognized since long as a powerful technique for the investigation of weak molecular transitions, through the attainment of broadband long absorption path length spectra. Multichannel grating spectrometers have been the traditional tool to measure the ICLAS data. Using Fourier transform (FT) interferometers instead of dispersers offers an interesting alternative. They have been already used with titanium-sapphire[a,b] and dye[c,d] ICLAS set-ups, in the visible range (up to 0.82 μm).
This talk will report progress made on the implementation[e] of a near-infrared intracavity laser absorption experiment coupled to a stepping-mode time-resolved FT interferometer[f]. Molecular spectra are obtained around 1 μm for absorption path lengths of tens of kilometers with an intracavity laser absorption set-up based on an optically pumped Vertical Cavity Surface Emitting Laser (VCSEL). ICLAS with VCSEL has already been applied successfully to spectroscopic studies with grating dispersers[g]. Specific advantages of the ICLAS and stepping-mode time-resolved FTS combination are discussed.

[a] S.-M. Hu, A. Campargue, Z.-Y. Wu, Y. Ding, A.-W. Liu, Q.-S. Zhu, Chem. Phys. Lett. 372, 659-667 (2003).
[b] D. Hurtmans, S. Kassi, C. Depiesse, M. Herman, Mol. Phys. 100, 3507-3511 (2003).
[c] C. Domingo, A. del Olmo, R. Escribano, D. Bermejo, and J. M. Orza, J. Chem. Phys. 96, 972-975 (1992).
[d] K. Strong, T. J. Johnson, and G. W. Harris, Appl. Opt. 36, 8533-8540 (1997).
[e] G. Guelachvili, Vibrat. Spectrosc. 29, 21-26 (2002). N. Picqué, Vibrat. Spectrosc. 29, 83-88 (2002). N. Picqué, G. Guelachvili, A.A. Kachanov, Opt. Lett. 28, 313-315 (2003). J.-Y. Mandin, V. Dana, D. Jacquemart, N. Picqué, G. Guelachvili, J. Quant. Spectrosc. Radiat. Transfer 78, 353-363 (2003). N. Picqué, G. Guelachvili, Mol. Phys. 101, 645-649 (2003).
[f] N. Picqué, G. Guelachvili, Appl. Opt. 39, 3984-3990, 2000.
[g] A. Campargue, E. Bertseva, and Y. Ding, J. Mol. Spectrosc. 220, 13-18 (2003). and references therein.