AN OFF AXIS CAVITY ENHANCED ABSORPTION SPECTROMETER AND A RAPID SCAN SPECTROMETER WITH A ROOM-TEMPERATURE EXTERNAL CAVITY QUANTUM CASCADE LASER

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Quantum cascade laser (QCL) is a new type of mid-infrared tunable diode lasers with superior output power and mode quality.[a] Recent developments, such as room temperature operation, wide frequency tunability, and narrow line width, make QCLs an ideal light source for high resolution spectroscopy. Two slit jet infrared spectrometers, namely an off-axis cavity enhanced absorption (CEA) spectrometer and a rapid scan spectrometer with an astigmatic multi-pass cell assembly, have been coupled with a newly purchased room temperature tunable mod-hop-free QCL with a frequency coverage from 1592 cm^{-1} to 1698 cm^{-1} and a scan rate of 0.1 cm^{-1}/ms.[b] Our aim is to utilize these two sensitive spectrometers, that are equipped with a molecular jet expansion, to investigate the chiral molecules-(water)$_n$ clusters. To demonstrate the resolution and sensitivity achieved, the rovibrational transitions of the static N_2O gas and the bending rovibrational transitions of the Ar-water complex,[c] a test system, at 1634 cm^{-1} have been measured.

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[a] D. Hofstetter and J. Faist in *High performance quantum cascade lasers and their applications, Vol.89* Springer-Verlag Berlin & Heidelberg, **2003**, pp. 61-98.

[b] Y. Xu, X. Liu, Z. Su, R. M. Kulkarni, W. S. Tam, C. Kang, I. Leonov and L. D'Agostino, *Proc. Spie*, **2009**, 722208 (1-11).

[c] M. J. Weida and D. J. Nesbitt, *J. Chem. Phys.* **1997**, 106, 3078-3089.