Trace Detection of Exhaled Breath N_2O and Dissolved N_2O in Human Gastric Juice Using External Cavity Quantum Cascade Laser Operating at 7.6 μm

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ABSTRACT:

In this work, we have given an experimental evidence of the presence of nitrous oxide (N_2O) dissolved in human gastric juice at parts per billion (ppb) level. N_2O is possibly produced endogenously in the human body from the reduction of nitric oxide (NO) **[1]** and the previous study shows that production NO in the gastric environment is strongly correlated with gastric pathogen *H.pylori* infection **[2]**. As the produced N_2O concentration is around few ppb levels, we have therefore incorporated a very high sensitive and high-resolution cavity ring down spectroscopy (CRDS) technique coupled with room-temperature widely tuneable QCL for the measurement of this trace molecular concentration. It was measured by probing an interference free ro-vibrational absorption line of N_2O originated from fundamental vibrational band with large absorption cross-section at 1307.19 cm^{-1}. We have found a typical concentration level of dissolved N_2O is about 165.03±91.42 ppb for the different gastric environment of different human subjects. We have also measured the exhaled breath N_2O concentration in empty stomach condition for establishing a potential link of N_2O present in gastric juice and exhaled breath.

Biography:

Mithun Pal received his M.Sc degree in 2014 from University of Calcutta, India. Now, he is senior research fellow in S. N. Bose National Centre for Basic Sciences, Kolkata, India. His research interests cover the following sectors: Development of Cavity ring down spectroscopy and WMS based optical gas sensors, environmental trace gas monitoring, and human breath research.

References:

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