SPONTANEOUS RAMAN SCATTERING MEASUREMENTS OF PURE NITRIC OXIDE USING A HIGH-POWER, NARROW LINEWIDTH, CW LASER

NEIL S. RODRIGUES, ROBERT P. LUCHT, *Mechanical Engineering, Purdue University, West Lafayette, IN, USA*.

The spectroscopy of nitric oxide (NO) is of significant interest for diagnostic purposes, since NO is a harmful pollutant from combustion systems and is subject to increasingly stringent emissions requirements. The Raman spectrum of NO is of particular interest because of the spin splitting in its ground electronic level. In a recent paper by Satija *et al.*[a], coherent anti-Stokes Raman scattering (CARS) spectroscopy was performed and a detailed model of the pure rotational Raman spectrum of NO was developed. Evidence of an electronic Raman transition at 121 cm^{-1} between the spin split ${}^2\Pi_{1/2} \rightarrow {}^2\Pi_{3/2}$ ground electronic levels was also observed, although the analysis of the CARS spectrum was complicated by the weakness of the electronic Raman transitions compared to the pure rotational transitions in the same spectral region. In the current work, high-resolution stimulated Raman spectroscopy measurements are performed using a high-power (18W) continuous-wave (CW) laser operating in single-frequency mode with a 0.00003 cm^{-1} linewidth near 532 nm. These measurements will aid in the theoretical development of NO Raman spectroscopy and will lead to more definitely determining the magnitude and sign of the $\langle \eta \mathrm{v}{=}0 | \hat{\alpha}^2{}_{q=2} | \eta \mathrm{v}{=}0 \rangle$ tensor element.

[a] A. Satija, N. Chai, M.T. Arendt, R.P. Lucht, *J Raman Spectroscopy* DOI: 10.1002/jrs.5836 [in-press].