MEASURING THE QUENCHING OF NO FLUORESCENCE PRODUCED FROM THE EXCITATION OF PHOTO-FRAGMENTED NITROBENZENE USING A PICOSECOND LASER.

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The military is interested in using spectroscopic methods to detect nitroaromatic compounds related to explosives. Upon absorption of a UV photon, nitrobenzene can dissociate into C_6H_5O and NO. Wynn, *et al.* [a] have shown that looking at NO fluorescence from the photodissociated nitrobenzene could be a possible detection method. However, the fluorescence can easily be quenched by molecular oxygen and other constituents in air. We have measured fluorescence lifetimes of the nascent NO resulting from photo-fragmented nitrobenzene using a pulsed picosecond tunable laser (pulse width ≈15 ps) by means of a two-color process. In the two-color process, photons of a particular energy dissociated the nitrobenzene while photons of a different energy probed the $A^2\Sigma^+ \leftarrow X^2\Pi_{(1/2,3/2)}$ NO band system between 225-260 nm. We have performed the measurements with different background pressures of He, N_2, and air. We present the results of these measurements which indicate considerable quenching of the NO fluorescence due to oxygen.

[a] Wynn, C. M.; Palmacci, S.; Kunz, R. R.; and Rothschild, M.Opt. Express, OSA, 2010, 18, 5399-5406