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Isotope selective detection of Nitric Oxide in sub-ppt range

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Nitric Oxide is a trace gas with manifold effects to biological systems like humans, animals and plants. It also works as a pollutant in the atmosphere which becomes more and more important due to increased NO emissions from anthropogenic induced combustion processes. We detect gaseous nitric oxide using one photon laser induced fluorescence (LIF). An ultraviolet beam from a tuneable frequency doubled dye laser excites the NO molecule electronically via the gamma band around 226 nm. We detect the following red shifted fluorescence between 245 and 248 nm with a photomultiplier. Interference from scattered laser light is removed by a band pass filter. The advantages of this method are the extremely high sensitivity and the excellent selectivity. In addition, LIF is a rapid and accurate technique. Theoretically, it is possible to detect 0.01 ppt (parts per trillion) of nitric oxide in real time. Therefore we are able to measure the $^{14}N^{16}O$ and $^{15}N^{16}O$ emissions from biological systems, e.g. human exhalation, plants and soils. Hence, tracer experiments with ^{15}N labelled NO precursors can be performed to investigate the mechanisms and the dynamics of the conversion from NO precursors to NO molecules.