S-nitrosothiols have received much attention in biochemistry and medicine as donors of nitrosonium ion (NO\(^+\)) and nitric oxide (NO) physiologically active molecules involved in vasodilation and signal transduction. Determination of S-nitrosothiols content in cells and tissues is of great importance for fundamental research and medical applications. We will report on our ongoing development of an instrument to measure trace levels of nitric oxide gas (NO), released from S-nitrosothiols after exposure to UV light (340 nm) or reaction with L-Cysteine+CuCl mixture. The instrument uses the method of cavity ring-down spectroscopy, probing rotationally resolved lines in the vibrational fundamental transition near 5.2 \(\mu\)m. The laser source is a continuous-wave, room temperature external cavity quantum cascade laser. An acousto-optic modulator is used to abruptly turn off the optical power incident on the cavity when the laser and cavity pass through resonance.