NOO PEROXY ISOMER EXPOSED WITH VELOCITY-MAP IMAGING\textsuperscript{a}

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NO\textsubscript{2}, a toxic gas formed in most combustion processes, plays an important role in the Earth’s atmosphere due to its role in the production of both photochemical smog and tropospheric ozone. The existence of the peroxy radial, NOO, has been proposed, both as a collision reaction intermediate, and as a negative-ion in some discharge sources, in order to account for extended tails seen in some photoelectron spectra.\textsuperscript{b}

In this work a velocity-mapped image of NO\textsubscript{2}\textsuperscript{−} photodetachment measured at 519 nm, shown, reveals high-energy electron structure, that persists at detachment energies lower than the electron affinity of ONO, 2.273 eV.\textsuperscript{b} The central ring has the spectral signature of O\textsuperscript{−}, while the outer-ripples, that appear in character to be similar to NO\textsuperscript{−} detachment, are, we propose due to the NOO\textsuperscript{−} peroxy radical, which is also responsible for the presence of O\textsuperscript{−}. The photoelectron spectrum resolves the vibrational structure to characterize the neutral peroxy radical. The identification is further supported by \textit{ab initio} calculations. The photoelectron angular distributions associated with the peroxy radical have a negative anisotropy parameter, opposite in sign to detachment from ONO\textsuperscript{−}.

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