

Changes in the vibrational population of $\text{SO}({}^3\Sigma^-)$ from the photodissociation of SO_2 between 202 and 207 nm

Resonance-enhanced multiphoton ionization with time-of-flight product imaging has been used to study the $\text{SO}_2 + h\nu \rightarrow \text{SO}({}^3\Sigma^-) + \text{O}({}^3\text{P}_2)$ channel in the ultraviolet photodissociation of sulfur dioxide at photolysis wavelengths between 202 and 207 nm.⁶ These imaging experiments allowed the determination of the vibrational populations of the $\text{SO}({}^3\Sigma^-)$ fragment at several wavelengths. As shown in Fig. 4, a change in the vibrational populations occurs from a distribution where most of the population is in $v=0$ for wavelengths shorter than 203.0 nm to one where the population is more evenly distributed for longer wavelength dissociation. The changes in the internal energy distribution are attributed to participation of two different predissociation mechanisms. Our data suggest that the predissociation mechanism below 203.0 nm involves an avoided crossing with the repulsive singlet state ${}^1\text{A}_1$.

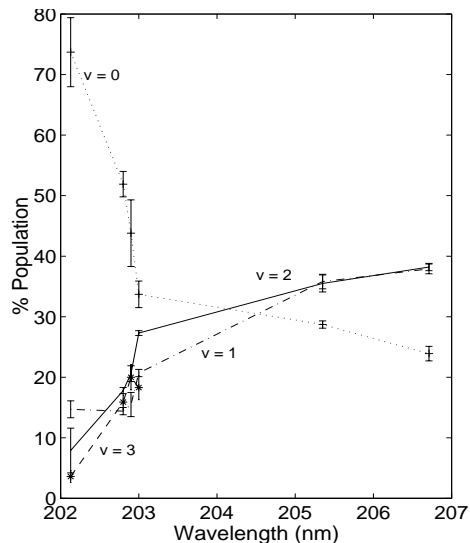


Figure 4 Vibrational populations of $\text{SO}({}^3\Sigma_g^-, v = 0-3)$ as a function of SO_2 photodissociation wavelength