Photocages in time-resolved X-ray studies of non-light responsive proteins

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Visualizing atomic and molecular motion in structural chemical biology poses a significant challenge. Recent advancements in ultrashort X-ray pulses have facilitated high-resolution studies of complex biomolecules. Despite these breakthroughs, the vast majority of proteins, especially non-photoactive ones, remain unexplored due to technical limitations. Our work relates to extending time-resolved X-ray diffraction to substrate-dependent systems, employing photocages to introduce biologically relevant substrates with spatiotemporal control. Through experimental studies on cytochrome *c* oxidase and other protein systems, this research aims to elucidate structural changes following native reactions and develop novel photocages for broader scientific applications in time-resolved studies of biomolecules.