

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Time-resolved infrared structural biology: Identification of Signature Vibrational Signals from the Active Site Tyrosine of Photoactive Yellow Protein ZHOUYANG KANG, BEINING NIE, LORAND KELEMEN, Departments of Physics, Oklahoma State University, Stillwater, OK, 74078, RACHANA RATHOD, WOUTER D. HOFF, Department of Microbiology & Molecular Genetics, Oklahoma State University, Stillwater, OK, 74078, AIHUA XIE, Departments of Physics, Oklahoma State University, Stillwater, OK, 74078 — Hydrogen bond interactions are indispensable for protein structure and function. We are developing techniques for time-resolved infrared structural biology that offers high sensitivity to hydrogen bonding interactions, excellent time resolution, and a broad time window. Here we report the identification of signature vibrational signals from the active site Tyr42 of photoactive yellow protein for quantifying hydrogen bond interactions using a strategic combination of site-directed mutagenesis (Y76F, Y94F, Y98F, Y118F), specific Tyr isotope labeling, and time-resolved FTIR spectroscopy. These PYP mutants preserve functional activity, thus optimal for probing functionally important structural changes at the active site. This experimental approach is broadly applicable to other proteins, paving the way to transform time-resolved infrared spectroscopy to time-resolved infrared structural biology.

Zhouyang Kang
Departments of Physics, Oklahoma State University, Stillwater, OK, 74078

Date submitted: 21 Nov 2010

Electronic form version 1.4