

Abstract Submitted
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Atomic Scale Force Spectroscopy of Protein Active Sites J.T. SAGE, Northeastern Univ., B.M. LEU, W. STURHAHN, E.E. ALP, Argonne Natl. Lab — Isotope-specific nuclear resonances allow X-ray photons to monitor local forces at the atomic scale. We use nuclear resonance vibrational spectroscopy (NRVS) to investigate ^{57}Fe embedded in protein matrices. Access to the complete spectrum of Fe vibrations allows experimental determination of effective local force constants. The *stiffness* reflects the force required to displace the probe nucleus with respect to its nearest neighbors and provides a direct probe of local structure. In contrast, the *resilience* describes the force required to displace the probe atom with neighboring atoms free to respond, and determines the thermal fluctuations of the Fe. We find that additional covalent links to the protein increase the resilience of the Fe site in cytochrome c as compared to myoglobin

J Timothy Sage
Northeastern University

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