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Learning from materials to uncover protein functionality with infrared light[1] DANIEL BANIN, Piedmont High School, LUCA MORESCHINI, BURHAN AHMED, DANIEL ELBOTT, Physics Department, University California Berkeley, SHANNON YAN, Institute for Quantitative Biosciences, University California, Berkeley and. 6Department of Molecular and Cell Biology, University of California, Ber, ZHIJIE CHEN, Institute for Quantitative Biosciences, University California, Berkeley, LIANA KLIVANSKY5, Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, California, ALESSANDRA LANZARA, Physics Department, University California Berkeley; Materials Sciences Division, LBNL, CARLOS BUSTAMANTE, Department of Molecular and Cell Biology, University of California, Berkeley; Howard Hughes Medical Institute, University of California, Berkeley — Over the past decade, the advancement of lasers sources and application to materials has led to the study and control of material's properties in novel ways. Here I will present a study where we used coherent infrared photons to probe the functionality of the enzyme alkaline phosphatase (ALP), a protein responsible for catalytic reaction, by adopting a similar methodology as the one developed for materials. By measuring specific protein's vibrations via FTIR and their dynamical evolution via absorption spectroscopy, new information about the catalytic process is provided. This work demonstrates that the combination of these two techniques, can be more broadly applied to the study of a variety of biological activity, and inform in general on the protein's functionality.

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