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Probing Protein Structural Dynamics Using Microfluidic Diffusional Mixer Based FT-MIR Micro-Spectroscopy PETER GALAJDA, ROBERT AUSTIN, Princeton University, JARMILA GURJARRO, JESUS VEGA, CYRUS ARIAN, AIHUA XIE, Oklahoma State University, AUSTIN TEAM, XIE TEAM — Time-resolved Fourier transform Infrared (FTIR) spectroscopy is a powerful technique to "see" proteins in action. Such a technique has been mostly applied to study photoreceptor proteins since their biological functions can be conveniently triggered in synchronization using short laser pulses. However, only a few proteins in nature are photo-active. In order to study a broad range of chemically activated proteins, we have developed a microfluidic diffusional mixing device, based on computational modeling of microfluidic flow and advection diffusion, microlithographic fabrication, and time-resolved FTIR micro-spectroscopy. This technique can be applied to probe functionally important structural dynamics of proteins that are chemically activated, thus opening up a broader application of time-resolved FTIR spectroscopic techniques. We will report such applications including experimental studies on GTPase system in biological signal transduction.

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