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Developing a Microfluidic Diffusional Mixer for Time-resolved Infrared Microscope Spectroscopic Studies of Protein Structural Dynamics PETER GALAJDA, ROBERT AUSTIN, Princeton University, JARMILA GUIJARRO, AIHUA XIE, Oklahoma State University — Information regarding protein structural dynamics is essential for understanding the structure-function relationships of proteins. Time-resolved Fourier transform infrared spectroscopy is a powerful technique for probing and characterizing the structures and structural dynamics of functional intermediate states of proteins. A key step is to trigger a synchronized biological process of proteins. We have designed and tested a microfluidic diffusional mixer for time-resolved infrared microscope spectroscopic studies of structural dynamics of chemically activated proteins. The design of the chip with micro-channels ensures rapid mixing. The microfluidic devices were fabricated in silicon using photolithography and deep reactive ion etching. An infrared microscope is employed so that the sample size can be as small as 50 microns in diameter. A syringe-pump was used to establish stable flow in the chip. A computer-controlled step-motor is used to move the micro-mixer chip for sampling different parts of the sample in the mixing channel.

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