Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Spontaneous and coherent Raman spectroscopy of microfluidic flows RAJAN ARORA, GEORGI PETROV, VLADISLAV YAKOVLEV, University of Wisconsin-Milwaukee, UNIVERSITY OF WISCONSIN-MILWAUKEE TEAM — Identifying protein structure and understanding its conformational dynamics are the grand challenges for biomedical science. The advent and most recent progress of microfluidics holds a promise of successfully addressing the major issues of structure determination—protein crystallization—by greatly multiplexing the evaluated number of crystallization conditions and protein dynamics—protein folding—by achieving a microsecond scale mixing. The further success of these approaches will strangely depend on the availability of remote probes capable of non-invasive interrogating the structure of biological molecules. Vibrational spectroscopy offers superior structural and chemical sensitivity, which can be successfully applied for characterizing transitional kinetics in microfluidic channels. In particular Raman and CARS give the molecular fingerprint along with structural information that is not possible with conventional fluorescence measurements. Here we are investigating the potential applicability of spontaneous and coherent Raman spectroscopy for protein folding and crystallization. Under suitable experimental conditions coherent Raman is seen to be 100 times more efficient than conventional Raman.

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Date submitted: 04 Dec 2007 Electronic form version 1.4