UIC College of Engineering 2009

Paul M. Chung Distinguished Lecture Series

Using Microfluidics to Control DNA Conformation for Genotyping, Sorting, and Analysis

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2:00-3:00 PM, Thursday, April 2, 2009, ERF 1043

ABSTRACT

Understanding the dynamics of biopolymers in complex flows is critical for the successful design of lab-on-a-chip devices. Work by Chu, Shaqfeh, and others using both Brownian dynamics simulations and direct, single molecule visualization methods have yielded unprecedented insights into DNA dynamics in simple shear, planar extension, and a range of linear mixed flows. Here, we focus on flows designed to stretch and manipulate DNA conformation for single molecule analysis; that is, flows designed to produce specific conformation fields. First, we present results on DNA in pressure-driven flow through a post array, and discuss insights from direct comparisons with Brownian Dynamics simulations by Shaqfeh and co-workers. Second, we consider stagnation point flows and, through the use of sequence-specific probes, demonstrate the potential of these flows for target sequence identification, single molecule studies of enzyme kinetics, and sorting. The design and use of a microfluidic "four-roll mill" that allows the entire spectrum of flow type (from extension to shear to rotation) to be generated in the vicinity of the stagnation point will also be described.

DETAILS

Lecture (2:00-3:00 PM) in Room 1043, Engineering Research Facility (ERF), 842 W. Taylor Street

Reception (3:00-4:00 PM) follows the lecture in the ERF Atrium.