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Department of Chemistry

Seminar

9:45 a.m. Thursday, October 3, 2013 • 331 Smith Hall



Associate Professor

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Micro Free Flow Electrophoresis: A Simple Device for Microscale Purification and High-Speed Monitoring

Research focus is bioanalytical chemistry, identifying areas of science that are limited by technology development, and developing new experiments or instrumentation to address those needs.

Website: <http://www.chem.umn.edu/groups/bowser/research.html>

Abstract

In free flow electrophoresis (FFE) a thin stream of sample is continuously introduced into a planar flow chamber. An electric field is applied perpendicularly to the flow through the separation chamber. Analytes are deflected laterally in the electric field according to their electrophoretic mobility giving rise to individual stream paths. FFE has recently been miniaturized into a microfluidic format (μ FFE), requiring less sample and reagents, a simplified flow profile and better heat dissipation.

The continuous nature of μ FFE separations suggests a number of novel analytical applications. For example, we have demonstrated how introducing a buffer gradient into the μ FFE device can be used to efficiently optimize a range of separation conditions in as little as five minutes. We have also explored introducing a gradient at the sample channel to titrate a fluorescently labeled aptamer with increasing concentrations of its protein target. Due to the continuous nature of gradient μ FFE, complete coverage of the binding curve is possible in as little as five minutes. μ FFE also offers the potential for impressive microscale purification. We have demonstrated how incorporating μ FFE selections simplifies isolation of high affinity aptamers while increasing the size of the selection pool. μ FFE is an ideal second stage for two dimensional separations. We have shown how directly coupling continuous μ FFE separations with nano liquid chromatography or capillary electrophoresis allows us to produce high peak capacity 2D separations in <15 minutes.

Refreshments will be served prior to the seminar.