

## **249g A Continuous Flow RNA Microfluidic Reactor for Rare Cell Profiling**

*Matthew B. Kerby, Robert Legge, and Anubhav Tripathi*

Microarray analysis provides detailed insight into active cellular pathways but requires more genetic material than techniques such as laser capture micro dissection can provide. Messenger RNA (mRNA) from scarce cell populations must be linearly amplified to quantify properly expression of rare mRNA transcripts. Batch reaction, where all reagents are added to a test tube at the start of the reaction, is a basic component common to current linear amplification methods. A continuous flow microfluidic reactor was developed to study the kinetics of a linear in vitro transcription reaction (IVT) of mRNA captured from rare cells and a 1000bp model template. The effect of cDNA template density, which is covalently attached to the channel or in a packed bed, on the reaction rate constants is investigated. The optimum conditions of flow rate and temperature in the IVT microreactor of a unit length are probed. We investigate reaction inhibition by product aRNA, which limits amplification in all conventional tube batch reactions, and propose a simple model for this continuous flow reactor. The device design, experimental results and model simulation will be presented.