SAN FRANCISCO STATE UNIVERSITY

Physics & Astronomy

MONDAY, APRIL 6TH

Dr. Adam Abate

University of California, San Francisco

4:00 PM in TH 411
Refreshments served at 3:50 PM

Droplet-based microfluidics for ultrahigh-throughput single-cell biology

Abstract:

My lab develops methods for analyzing, sorting, and engineering single cells using droplet based microfluidics. In this presentation, I will describe ways in which we are using this to evolve new enzymes and, by combining it with next-generation sequencing (NGS), to model enzyme sequence-function relationships. By applying this technique to cell-free extracts and automating with robotics, we are performing in vitro automated, continuous evolution to engineer new biosynthetic pathways. Using related techniques, we have developed a new method for sorting cells we call PCR-Activated Cell Sorting (PACS) that allows enrichment of rare cells out of a heterogeneous population based on infection by specific viruses, the expression of specific genes, or the presence of unique microRNAs. By pairing PACS with sequencing of cellular genomes and transcriptomes, we can correlate the presence of the target sequences with host cell phenotypes. We are applying this to intratumor heterogeneity and latency of HIV infection in patients undergoing antiretroviral therapy. All of these projects leverage the unparalleled ability of droplet-based microfluidics for performing millions of single cell reactions.