

High-throughput High-content Developmental Biology and Neurogenetics

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We are interested in engineering micro systems and automation tools to address questions in systems neuroscience, developmental biology, and cell biology that are difficult to answer with conventional techniques. Micro technologies provide the appropriate length scale for investigating molecules, cells, and small organisms; moreover, one can also take advantage of unique phenomena associated with small-scale flow and field effects, as well as unprecedented parallelization and automation to gather quantitative and large-scale data about complex biological systems. In this talk, I will show two examples: microfluidic systems coupled with artificial intelligence for automated high-resolution imaging and high-throughput genetic screens in *C. elegans*, and chips for imaging and manipulating cells in the context of immune signal transduction. Our methods enable such systems level studies 100-1000 times faster than traditionally done, and in many occasions yield unique quantitative data that cannot be obtained otherwise.