Centre for Biosystems Science and Engineering

S E M I N A R

at 4:00 PM on February 22, 2016
Seminar Hall, MRDG

Microfluidic devices for high-resolution imaging of C. elegans

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Microfluidic devices have been developed for imaging various in vivo model systems such as C. elegans, Drosophila larvae, and zebrafish. C. elegans with small body size and ability to grow in liquid environment is suitable for microfluidic devices. Microfluidic devices have been developed for imaging behaviour and various cellular processes in C. elegans, but not sub-cellular processes requiring high spatial resolution. In neurons, essential processes such as axonal transport can be studied by acquiring fast time-lapse images of GFP tagged moving cargos. We have developed a microfluidic device to image mitochondrial transport in unanesthetized intact animals that contribute to the long-term mitochondrial distribution in a developing neuronal process. In my second part of the talk, I will describe a large-scale microfluidic platform to enable both high-throughput and high-resolution imaging of multiple C. elegans populations. This platform can image 15 z-stacks of ~4,000 C. elegans from 96 different populations using a single chip with a micron resolution in 16 min. Using this platform, we screened ~1,000 FDA approved drugs in improving the aggregation phenotype of a poly-glutamine aggregation (PolyQ) model to identify possible proteostasis modulators, resulting in 4 potential hits.

About the speaker:

Sudip Mondal completed his Bachelor's degree from St. Xavier's College in University of Kolkata, followed by a Master's degree from Department of Physics, Indian Institute of Science, in 2004. He received a Ph.D. degree in Physics from Department of Physics, IISc in 2008. During this time, he developed a portable real-time PCR instrument for DNA amplification. He completed his post-doctoral research at NCBS, Bangalore, developing microfluidic devices for high-resolution imaging of neuronal cargoes in C. elegans neurons to study in vivo transport parameters. Currently, he is a postdoctoral researcher at The University of Texas at Austin developing large-scale microfluidic imaging platforms for drug screening using C. elegans disease models.