THURSDAY, DECEMBER 1, 2011

GORDON COLLEGE, WENHAM, MA

Meeting Schedule:

12:30-1:00	Meeting Registration (KOSC 124 - E on Campus Map)
1:00-1:10	Welcoming Remarks
1:10-2:00	**"Using Light to Illuminate Alternative Splicing Decisions in the Nervous System"**, John Calarco, Ph.D., Bauer Fellow, FAS Center for Systems Biology, Harvard University, Cambridge, MA
2:00-2:50	**"Dramatic Reduction of Surface Recombination by *in situ* Surface Passivation of Silicon Nanowires"**, Yaping Dan, Ph.D., School of Engineering and Applied Sciences, Harvard University, Cambridge, MA
2:50-3:20	Coffee Break
3:20-4:10	**"Intermediate Phenotypes: Insights in biology through pathology"**, Praveen Arany, Ph.D., School of Engineering and Applied Sciences, Harvard University, Cambridge, MA
4:10-5:00	**"Imaging Circuit Organization in the Mouse Visual System"**, Josh Morgan, Ph.D., Dept. of Molecular and Cellular Biology, Harvard University, Cambridge, MA
5:00-5:45	Business Meeting
5:45-6:15	Student Poster Session
6:15-7:30	Dinner (Chairman's Room)
7:30-8:30	**"Illuminating Biological Processes with Fluorescence Microscopy"**, Jennifer Ross, Ph.D., University Massachusetts Amherst, Amherst, MA
8:30-8:40	Closing Remarks

Abstracts & Bios

1:10 pm – **Using Light to Illuminate Alternative Splicing Decisions in the Nervous System**

Dr. John Calarco, Harvard University

Abstract:
Recent genome-wide analyses of transcriptomes from several metazoans have identified networks of spatio-temporally regulated alternative splicing events. The existence of these highly regulated splice variants, and their elevated levels of conservation relative to other classes of splicing events, suggests that they play critical roles in development and in the generation of tissue diversity. A major challenge that lies ahead is to determine the functional role of these isoforms in the cell and the mechanisms that govern their regulation. In this talk, I will discuss our work focusing on splicing regulation in the nervous system. Specifically, I will present recent and ongoing research investigating developmental stage- and neuron-specific alternative splicing regulation in the nematode *Caenorhabditis elegans*.

Bio:
John Calarco conducted his doctoral work at the University of Toronto, studying RNA regulation in the nervous system, with a particular focus on the mechanisms and functional consequences of tissue-specific alternative pre-mRNA splicing during neuronal differentiation. He is currently continuing this work as a Bauer Fellow at the FAS Center for Systems Biology at Harvard University.

2:00 pm – **Dramatic Reduction of Surface Recombination by *in situ* Surface Passivation of Silicon Nanowires**

Dr. Yaping Dan, Harvard University

Abstract:
Nanowires have unique optical properties and are considered as important building blocks for energy harvesting applications such as solar cells. However, due to their large surface-to-volume ratios, the recombination of charge carriers through surface states reduces the carrier diffusion lengths in nanowires a few orders of magnitude, often resulting in the low efficiency (a few percent or less) of nanowire-based solar cells. Reducing the recombination by surface passivation is crucial for the realization of high performance nanosized optoelectronic devices, but remains largely unexplored. In this talk, I will present a highly effective means for surface passivation of silicon nanowires, using a thin layer of amorphous silicon formed in-situ during nanowire growth. The experimental results obtained by near-field scanning photocurrent microscopy indicate a ~100-fold reduction in surface recombination. The quenched surface recombination prolongs the carrier lifetime and consequently increases photosensitivity or energy conversion efficiency when the nanowires are used as photodetectors or solar cells.

Experimental measurements indicate a ~90-fold increase in the photosensitivity of passivated nanowires, as compared to unpassivated ones, which has major implications for solar energy conversion devices.

Bio:
Dr. Yaping Dan is currently a postdoctoral fellow in the School of Engineering and Applied Sciences at Harvard University. He received the B.S. degree in electrical engineering from Xi'an Jiaotong University, Xi'an in 1999, the M.S. degree in microelectronics from Tsinghua University, Beijing, China, in 2002, and the Ph.D. degree in electrical engineering from University of Pennsylvanian in 2008. Yaping Dan has coauthored more 20 scientific articles, one book chapter and 8 patents or patent applications. He was a winner of the Postdoctoral Fellowship Award from National Research Council of US National Academies, November 2009.

3:20 pm – **Intermediate Phenotypes: Insights in biology through pathology**

Dr. Praveen Arany, Harvard University

Abstract:
Wound healing is a fascinating dichotomy of an 'intermediate' phenotype as there are elements of malignancies and development intertwined amongst its natural course. This presentation will address two aspects of wound healing that began as simple microscopic observations and have led to mechanistic insights into the underlying biological processes. The first project was motivated by a clinical observation of large, bizarre osteoclasts in a peculiar clinical presentation of osteonecrosis of jaw bones following a widely used drug - bisphosphonates. Exploration of the underlying mechanism implicates the unique micro-mechanical environment of the jaws in the aberrant jaw bone homeostatic process. The second project began as a clinical study of laser stimulated oral healing and has led to unraveling of a unique photomolecular mechanism involving growth factor activation. This light-based mechanism has been harnessed to drive stem cell differentiation in a clinical tooth regeneration model.

Bio:
Praveen Arany received Bachelors and Masters in Dental Surgery in 1999 and 2001 respectively from India. He did two brief postdoctoral stints at the Indian Institutes of Science (2003) and at the National Institutes of Health, Bethesda (2006) focused on signal transduction. More recently, he completed his M.M.Sc. and Ph.D. from Harvard University (2011). He also has certification in clinical and translational research (NIH 2006 and HMS 2011). He has 16 peer reviewed publications, 7 invited reviews / book chapters, 2 patents and has numerous awards to his credit such as the NIH Young Investigator, Eugene seidner award, Wound healing society young investigator and AADR pulp regeneration award among others. He is currently a research associate at Harvard School of Engineering and Applied Sciences.

4:10 pm – **Imaging Circuit Organization in the Mouse Visual System**

Dr. Josh Morgan, Harvard University

Abstract:
Serial reconstruction of electron micrographs provides the most complete view of local neuroanatomy available. However, reconstructing large volumes of tissue with traditional EM techniques is extremely time consuming. The Lichtman lab has developed a number of techniques, including automated tape collection of sections and high speed acquisition of scanning electron micrographs, that make it possible to rapidly acquire large volumes of high resolution data. I will talk about our current progress in refining these techniques as well as their application to reconstructing circuits within the mouse visual system.

Bio:
After getting a BA in neurobiology, Josh Morgan joined Rachel Wong's lab to study the role of neuronal activity in patterning retinal circuits. During his time as a graduate student, and later, as a post doc in the Wong lab, he used confocal and two-photon microscopy to study retinal bipolar cell morphogenesis and how the connectivity between retinal bipolar cells and retinal ganglion cells changes over the course of postnatal development. In 2009, Josh joined Jeff Lichtman's lab in order to apply large scale serial electron microscopy to understanding the organization of retinal ganglion cell axons converging in the lateral geniculate nucleus of the mouse.

7:30 pm – **Illuminating Biological Processes with Fluorescence Microscopy**

Dr. Jennifer Ross, University Massachusetts Amherst

Abstract:
Light and fluorescence microscopy techniques have opened wonderful avenues to life science researchers. Recent techniques in single molecule imaging have further illustrated the activities of living and dynamic cells. Our lab uses single molecule total internal reflection fluorescence microscopy to interrogate biological molecules outside of cells to determine their mechanisms of action. We focus on the microtubule cytoskeleton, an essential and dynamic network of filaments required for cell shape, cell division, and cell differentiation. I will discuss several experimental systems in my lab that we use to determine the physical properties of microtubules and how they are tuned by accessory proteins and enzymes.

Bio:
Dr. Jennifer Ross is an Assistant Professor of Physics at the University of Massachusetts Amherst. She has won several research and teaching awards including the Cottrell Scholars Award from Research Corporation for Scientific Advancement (2011) and a Basil O'Connor Starter Award from the March of Dimes (2009). She has given invited talks at Microscopy and Microanalysis, the Biophysical Society Meeting, and the American Physical Society March Meeting. She is the technical director of UMass's NSF-funded super-resolution fluorescence microscopy facility that is working to open in August 2012. This user facility will be open to on

and off-campus users needing to employ FPALM, STORM, and multi-color total internal reflection fluorescence microscopy.

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