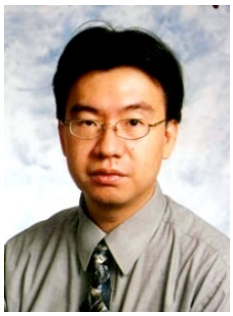
ELECTRICAL & COMPUTER ENGINEERING BIO-SEMINAR Spring 2017 | ENGINEERING TEXAS A&M UNIVERSITY

When: **Friday 15:00 – 16:00**
Where: **ETB 1003**



Speaker: **Prof. Jun Kameoka**

Associate Professor
Department of Electrical & Computer Engineering
Texas A&M University

Date: **03-10-2017**

Title: **Development of automated high throughput single molecular microfluidic detection platform for Cancer research and treatment**

Abstract: Single molecular microfluidic detection (SMMD) approach is the powerful method to dissect multiple molecular interactions quantitatively such as protein-protein interactions that cannot be achieved by other methods such as mass spectrometry or enzyme-linked immunosorbent assay (ELIZA). Quantitative results about molecular interactions provide insight into critical signal transductions that potentially lead to discovery of new target drug. Additionally, the efficacy of molecular targeting drug can be pre-screened before usage that can reduce the side effect. Although this approach has much potential for molecular signaling application, the throughput is very low and it is labor intensive. To improve the performance of SMMD, fully automated microfluidic single molecule detection platform is developed. This platform consists of microscope single molecule fluorescent detection system, microfluidic array device, automatic XY-stage and automated potential application system via relay and microcontroller. The microfluidic array device is made of quartz wafer that have 32 microchannels, gold electrodes at each reservoir at which biological sample solutions are dispensed. The other end of electrodes is connected to probes for potential applications for electroosmotic pumping. The microfluidic array is fixed on the automated XY-stage, which can control the position of microfluidic channels. The detection sequence includes 3 steps, (1) positioning the target microfluidic channel to the laser detection volume, (2) applying potential via relay system to target reservoirs for pumping, (3) acquiring molecular data. After acquiring 1000 molecular interaction data from the first microchannel, automated stage positions to focus the laser to the next microchannels. Meanwhile, relay starts applying the potential to the second microchannel for molecular detection. This sequence continues until all samples are characterized. As a result, we estimate that 32 samples can be analyzed for about 6 hours; on the contrary, conventional labor intensive approach can analyze 2 samples for 6 hours.

Biography: Dr. Kameoka joined Texas A&M University in 2004 and also joined The University of Texas at MD Anderson cancer Center in 2005 as adjunct professor. He is recognized as an expert for nano and microfluidics, soft sensor and actuators, biomaterial. His application includes Cancer drug screening and development, high throughput microparticle production platform for tissue engineering, pneumatic micro robot and sensor. Outcomes of these research projects are published in high ranked journals such as Nano-letter, Lab-on-a-chip and conference proceedings in IEEE EMBS or SPIE. So far, he has published more than 100 peer reviewed publications for these topics. His research has been funded by private companies, NIH, NSF, Texas state, CPRIT and DOD. He is a founder of a couple of start-up companies, which provides new microfluidic based drug screening devices. He received MS and PhD from Electrical Engineering department at Cornell University under Prof. Craighead‘s supervision.