*Our lab is interested in sensing and controlling biological complex systems through the utilization of various engineering technologies including Feedback System Control(FSC), Mass Cytometry(CyTOF), Micro/Nanofabrication and Artificial Intelligence(AI).For more information, please refer to our website : http://www.dinglab.com.cn/*

What we do

Bio-complex systems involve layers of signaling molecules from genomics to proteomics to metabolomics to immunology and to phenology. A diseased system often recruits an ensemble of signaling targets with aberrant expressions. Our group has two major research focuses: 1) disease diagnostics by detecting multiple disease-correlated targets simultaneously to enable super-early disease diagnostics; 2) disease therapeutics by manipulating multiple disease-correlated targets simultaneously to develop potent combinatorial drug therapy. To achieve these research impetuses, many challenging problems related to physics, engineering, chemistry, mathematics and biomedical applications need to be overcome.

1. Single-cell mass cytometry

We are developing mass cytometry(also named, CyTOF) technique for single-cell analysis. CyTOF is a mass spectrometry technique based on inductively coupled plasma mass spectrometry combined with mass tags that allows accurate measuring of various molecular species on single cells in a highly mutiplexed fashion. In this approach , antibodies are tagged with isotopically pure erath elements and these are used to tag the compoents of cells. Currently, we are able to etect up to 40 parameters(surface proteins, signaling proteins, mRNA, etc.) on a single-cell level. We are one of the first few labs world widely and the first lab in China who has developed this capacity.
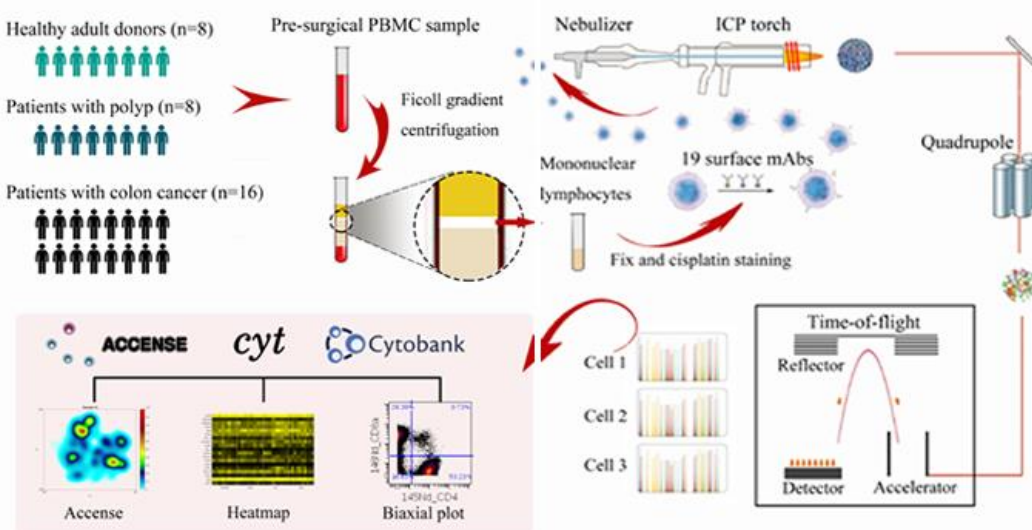

2. Tissue in situ high through mass specutrum imaging

Our lab is amongst the world's most advanced laboratories for mass spectrometry imaging. With atate of the art equipment and a highly experienced staff, we are developing enabling technology with unique ability to acquire cellular and molecularly specific images and to provide multiplexed information. Given a tissue sample, we are capable of high dimensional protein and RNA analysis withou the need to digest the tissue into suspended single cells. We are the first lab in Asia who is equipped with this capability.
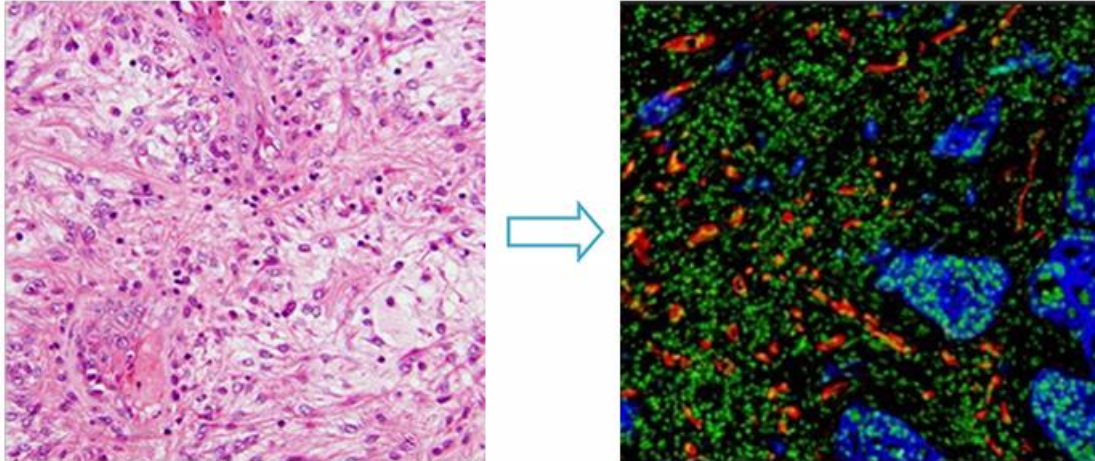
3. Large-scale drug combination optimiation

We are interested in developing enabling techniques to facilitate the optimization of large-scale drug candidates for potent therapy. The techniques we are working on include Feedback System Control(FSC), Parabolic Response Surface(PRS) and Compressive Sensing. These techniques allow identification of effective drug combination therapies both for a population or individual with minimal experimental efforts.
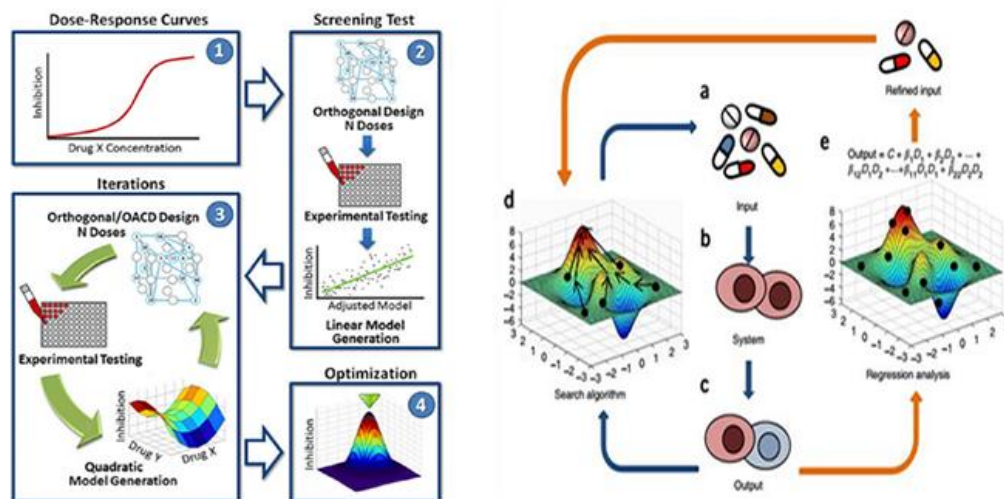
4. Portable bio-sensors for disease diagnosis

We are developing portable bio-sensors with microfluidics, bio-electrocchemistry, hydrogel and surface modification skills for point-of care technologies(POCT). We have independent clean room, which is fully capable for regular micromachining process such as photolithography and 3D mold priting. The applications inclede circulating tumor cell(CTC) separation, portable PCR plaform, remote toxic gas detector, single-exosome analysis, etc.
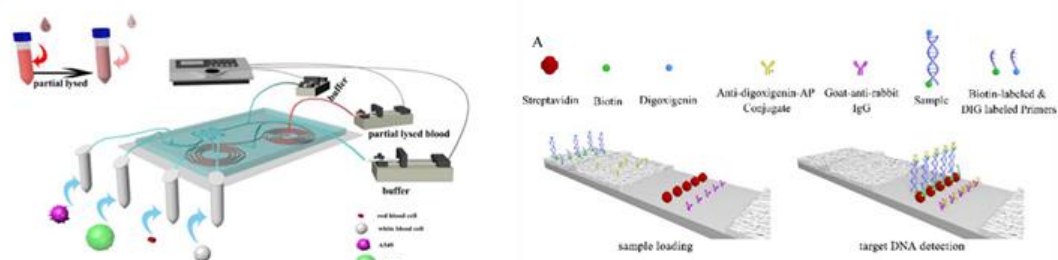
Research Opportunity

Our lab is highly interdisciplinary and is always seeking skilled, motivated, and team-oriented individuals to join our dynamic group. If you are interested in working with our lab or would like more information, please send a resume to Professor Ding (dingxianting@sjtu.edu.cn)

Postdoc

Our lab has several openings for postdoc with **lab-on-a-chip, computational biology, combinatorial drug development, microfluidics skills.** Individuals expertise in cell culture, micro fabrication, computational biology, and biosensors engineering, materials, computer science, pharmacology, chemistry, biology, biochemistry, clinical medicine, molecular biology, microbiology, immunology, etc. are welcomed to submit your resume to (dingxianting@sjtu.edu.cn)

Graduate

Graduate students from backgrounds in engineering, physics, chemistry, biology, and materials science are encouraged to apply to our lab. **For international students (Non-Chinese citizens), once admitted to our lab, we have >95% chance (almost guaranteed) to issue you a full scholarship**. For more information about the international graduate admission process, please refer to (http://www.dinglab.com.cn/) or contact Guilin Zhao (258047199@qq.com)

Undergraduate

Undergraduate students are encouraged to contact Professor Ding or directly contact current graduate students and post-docs about potential research projects. Undergraduates can receive directed research credits for working alongside current graduate students and post-docs and we will list potential opportunities as they arise. We also participate in the PRP program during the school year, and also encourage interested undergrads to work in our lab through summer research programs or internships.
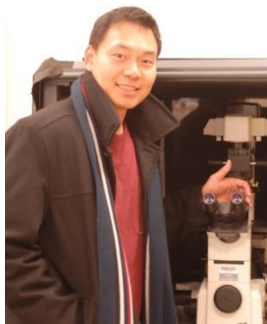
Professors
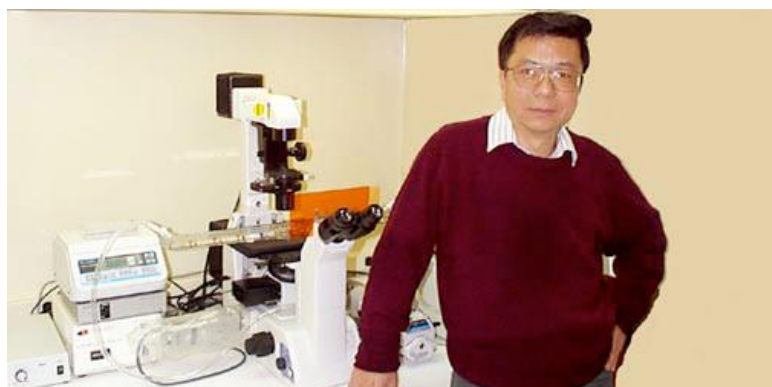
Dr. Chih-Ming Ho holds the Ben Rich-Lockheed Martin Professor in UCLA School of Engineering. After receiving his Ph.D. from The Johns Hopkins University, Dr. Ho started his career at the University of Southern California and rose to the rank of Full Professor. In 1991, he moved to the University of California, Los Angeles to lead the

establishment of the micro-electro-mechanical-system (MEMS) field in UCLA and served as the founding Director of the Center for Micro Systems. To this day, the UCLA MEMS research has been recognized as one of the top three programs in the world. He is the Director of NIH supported Center for Cell Control (CCC) and was the Director of NASA supported Institute for Cell Mimetic Space Exploration (CMISE). He served as UCLA Associate Vice Chancellor for Research from 2001 to 2005.

He is known for his contributions in bio-nano technology, micro/nano fluidics, and turbulence. He was ranked by ISI as one of the top 250 most cited researchers in all engineering category around the world. In 1997, Dr. Ho was inducted as a member of the National Academy of Engineering. In the next year, he was elected as an Academician of Academia Sinica which honors scholars of Chinese origin with exceptional achievements in liberal arts and sciences. Dr. Ho holds seven honorary professorships. He has published 300 papers and 10 patents. He presented over 150 keynote talks in international conferences. Dr. Ho was elected Fellow of the American Physical Society as well as American Institute of Aeronautics and Astronautics for his contributions in a wide spectrum of technical areas.

In addition to his academic accomplishments, he has made extensive contributions to the professional societies around the world. He has chaired the Division of Fluid Dynamics (DFD) in American Physical Society, which is the leading platform in the United States for scientists interested in fundamental fluid dynamics. He was on the advisory board for AIAA Journal. He is a member of the IEEE/ASME JMEMS coordinating Committee. He was an Associate Editor of the ASME Journal of Fluids Engineering and an Associate Editor of the AIAA Journal. He also has served as a Guest Editor for Annual Review of Fluid Dynamics.

On the international level, he has served on advisory panels to provide assistance to many countries and regions, China, France, Hong Kong, Israel, Japan, Korea, Switzerland, Taiwan, Thailand, and United Kingdom on the developments of nano/micro technologies. Dr. Ho also has chaired or served on numerous organizing committees of international conferences on high technology topics.

Dr. Xianting Ding is professor at School of Biomedical Engineering, Institute for Personalized Medicine, Shanghai Jiao Tong University. He received his Ph.D. degree from Department of Mechanical Engineering at University of California, Los Angeles (UCLA) in 2012. His research interests focus on developing Personalized Therapy and Precision Medicine, including: 1) developing bio-sensors for early detection of cancer, infectious disease, metabolic diseases, age-related diseases, cardiovascular diseases, based on cellular electrochemical, impedance, mechanical and photonic signaling; 2) developing personalized treatment; optimizing drug combinations; studying drug-drug interactions; building up models for bio-complex systems, based on Feedback System Control (FSC), Microfluidics and Bio-MEMS; 3) Traditional Chinese Medicine (TCM) modernization, extraction, purification, and re-combination for treating ischemia, osteoporosis and depression.

He participated in the early investigation and development for 3 international research centers, including Institute for Cell Mimetic Space Exploration (CMISE, funded by NASA), Center for Cell Control (CCC, funded by NIH) and Institute for Personalized Medicine (IPM, funded by Chinese Central Organization Department). He is now leading 16 combinatorial-drug-optimization related international projects. He is the editorial board member for *Scientific Reports* and *Journal of the Association for Laboratory Automation (JALA)*, the reviewer for 7 journals, published 50 peer reviewed journal papers and filed 20 national or international patents.

Research Interests: Personalized medicine; Drug Combination Optimization; Bio-sensors; Microfluidics; CyTOF

Contact

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https://sites.google.com/g.ucla.edu/chih-ming-ho-system-laboratory

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