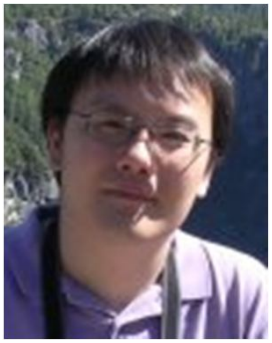
Yung-Shin Sun
Assistant Professor, Department of Physics
E-mail：089957@mail.fju.edu.tw



Education

Ph.D. Physics, University of California at Davis, 2010.
M.S. Physics, National Taiwan University, 2002.
B.S. Physics, National Taiwan University, 2000.

My research interests include two parts: (1) Developing optical microscopes based on oblique-incidence reflectivity difference (OI-RD) technique to detect biomolecular interactions in microarray format; (2) Designing microfluidic chips for biomedical applications such as cell migration in controllable micro-environments. The second part is in cooperation with Dr, Ji-Yen Cheng in the Research Center for Applied Science (RCAS), Academia Sinica.

Label-Free Biosensor

Characterization of binding reactions between surface-immobilized targets and solutions-phase analytes routinely involves fluorescence-based detection methods. However, labeling analytes inevitably changes innate properties of the molecules and in turn modifies analyte-target interactions in an often uncharacterized way. As a result, label-free microarray detection is desirable. Optical microscopes based on oblique-incidence reflectivity difference (OI-RD) technique are developed and used to detect biomolecular interactions in microarray format. OI-RD, a most sensitive form of optical elliposometry, measures the difference in reflectivity change (both magnitude and phase) between p- and s-polarized components of an optical beam. Such a difference is related to the thickness and dielectric constant of surface-immobilized biomolecules.

Microfluidic Chips

Microfluidic systems provide powerful tools for controlling the *in vitro* cellular microenvironment which best mimicking the *in vivo* biological matrix. Such devices have been applied to both temporal and spatial manipulation of cell growth and stimuli by micro-scaled channels, patterns, and fluidic systems, creating new opportunities for biologists to study cellular behaviors under different physical and chemical conditions. There are various concepts and strategies in designing microfluidic devices for culturing, manipulating, and stimulating cells under well-established microenvironments.

Selected publication

1. **Yung-Shin Sun**, Shih-Wei Peng, and Ji-Yen Cheng. *In vitro electrical-stimulated wound-healing chip for studying electric field-assisted wound-healing process,* Biomicrofluidics 6, 034117 (2012).
2. **Yung-Shin Sun**, Shih-Wei Peng, Keng-Hui Lin, and Ji-Yen Cheng. *Electrotaxis of lung cancer cells in ordered three-dimensional scaffolds*, Biomicrofluidics 6, 014102 (2012).
3. Kai-Yin Lo*, **Yung-Shin Sun***, James P. Landry, Xiangdong Zhu, and Wenbin Deng. *Label-free detection of surface markers on stem cells by oblique-incidence reflectivity difference microscopy*, BioTechniques 50, 381 (2011) (*equal contribution).
4. **Y. S. Sun**, J. P. Landry, Y. Y. Fei, X. D. Zhu, J. T. Luo, X. B. Wang, and K. S. Lam. *Macromolecular Scaffolds for Immobilizing Small Molecule Microarrays in Label-Free Detection of Protein-Ligand Interactions on Solid Support*, Analytical Chemistry 81, 5373 (2009).
5. **Y. S. Sun**, J. P. Landry, Y. Y. Fei, X. D. Zhu, J. T. Luo, X. B. Wang, and K. S. Lam. *Effect of Fluorescently Labeling Protein Probes on Kinetics of Protein-Ligand Reactions*, Langmuir 24, 13399 (2008).