專任老師

李健峰
教授

Kin-Fong Lei

長庚大學 生物醫學工程學系

現職

教授

學歷

香港中文大學，博士
香港中文大學，碩士
國立清華大學，學士

研究專長

生醫微機電系統、微流體系統、生物分子操控、生醫感測

聯絡分機

03-211-8800 #5345

E-mail

kflei@mail.cgu.edu.tw

經歷

長庚大學教授，2018 年至今
訪問學者，德國慕尼黑工業大學，2019 年夏
美國科羅拉多大學丹佛分校，訪問學者，2016 年夏
訪問學者，香港中文大學，香港，2015 年夏
台灣長庚大學副教授，2014-2018
暑期台灣中央研究院訪問學者，2013 年
台灣長庚大學助理教授，2010-2014
講師，香港理工大學，香港，2007-2010
香港生產力促進局助理顧問，香港，2006-2007
加拿大西安大略大學博士後研究員，2006

實驗室

生醫微機電實驗室(工學大樓 4 樓)

個人研究

Research Projects:

- PI, Analysis of cell proliferation and protein expression of multilayered artificial blood vessel in microfluidic channel under physcial and chemical stimulation, Ministry of Science and Technoloy, Taiwan MOST 111-2221-E-182-006-MY3, TW$4,206,000, 1 Aug 2022 - 31 July 2025.

- PI, Investigation of cancer cell stemness based on cellular electrical impedance properties in a microfluidic platfrom, Ministry of Science and Technology, Taiwan, MOST110-2221-E-182-029, TW$1,226,000, Aug 1, 2021 - July 31, 2022.

- PI, Investigation of the stem-like property of cancer cells co-culturing with macrophages under continuous microfluidic flow environment, Chang Gung Memorial Hospital, Taiwan, CMRPD2L0061, TW$2,060,866, Aug 1, 2021 - July 31, 2023.

- PI, Investigation of the electrical properties of cancer stem cells using a dielectrophoretic and impedimetric hybrid microfluidic platform, Chang Gung Memorial Hospital, Taiwan, CMRPD2L0011, TW$2,812,929, Feb 1, 2021 - Jan 31, 2024.

- PI, Cancer metastatic potential evaluated by biophysical properties of CTC based on automatically impedimetric monitoring of 3D cell invasion in a microfluidic system, Ministry of Science and Technology, Taiwan, MOST108-2221-E-182-058, TW$926,000, 1 Aug 2019 - 31 July 2020.

- PI, Development of a 3D wound healing assay and impedimetric monitoring of cell invasion process in a microfluidic system, Chang Gung Memorial Hospital, CMRPD2J0061, TW$2,344,315, 1 Aug 2019 - 31 July 2021.

- PI, Development of a nanofiber/polymer composited microfluidic system and demonstration on impedimetric monitoring of cell proliferation, chemosensitivity, hypoxia, migration, and multi-cellular co-culture in 3D environment, Ministry of Science and Technology, Taiwan, MOST107-2221-E-182-053-MY3, TW$3,160,000, 1 Aug 2018 - 31 July 2021.

- PI, Development of a microfluidic system for the investigation of the inhibition mechanisms of tumor spheroids under the combined stimulation of anti-cancer drug and electric field, Chang Gung Memorial Hospital, CMRPD2H0021, TW$3,606,198, 1 Feb

2018 - 31 Jan 2021.

- PI, Investigation of the inhibiting effect of co-culturing cancer cells and fibroblast cells under the application of alternating electric field in a microfluidic device, Chang Gung Memorial Hospital, CMRPD2G0171, TW$2,281,715, 1 Aug 2017 - 31 July 2019.

- PI, Quantification of the formation process and the chemosensitivity of cancer cell colonies suspending in hydrogel during culture course, Chang Gung Memorial Hospital, CMRPD2F0031, TW$2,094,315, 1 Feb 2016 - 31 Jan 2018.

- PI, Development of a paper-based 3D co-culture microfluidic system for real-time and non-invasive impedimetric monitoring of cell-cell interaction under various cytokine conditions, Ministry of Science and Technology, MOST104-2221-E-182-014-MY3, TW$2,721,000, 1 Aug 2015 - 31 July 2018.

- PI, A paper-based cell culture and subsequent immunoassay microfluidic system for the investigation of cancer cell phosphorylation and signaling pathway, Chang Gung Memorial Hospital, CMRPD3E0101, TW$2,102,043, 1 Jan 2015 - 31 Dec 2016.

- Co-PI, Real-time analysis and optimizing environment for human tenocyte proliferation, Ministry of Science and Technology, MOST103-2218-E-182A-003, TW$640,000, 1 Oct 2014 - 31 July 2015.

- Co-PI, Real-time analysis of tissue-specific cellular proliferation and optimization in platelet-rich-plasma (PRP) prolotherapy, Chang Gung Memorial Hospital, CMRPG5D0171, TW$1,077,555, 1 Aug 2014 - 31 July 2015.

- PI, Development of a microfluidic system incorporating with material regulation property for on-chip impedimetric monitoring cancer stem cell selection and anti-cancer drug screening, Ministry of Science and Technology, MOST103-2221-E-182-004-MY3, TW$2,902,000, 1 Aug 2014 - 31 July 2017.

- PI, Label-free immunoassay quantitatively detected by paper-based microfluidic carbon nanotube sensing device, Chang Gung Memorial Hospital, CMRPD2D0021, TW$762,755, 1 Jan 2014 - 31 Dec 2014.

- PI, Development of a microfluidic automatic immunoassay system and demonstration of rapid influenza screening, Chang Gung Memorial Hospital, CMRPD2C0141, TW$1,934,315, 1 Oct 2013 - 30 Sept 2015.

- PI, Development of a microfluidic perfusion 3D cell culture and measurement biochip

for continuous monitoring 3D cellular dynamic response under varied culture conditions, National Science Council, NSC101-2221-E-182-003-MY3, TW$2,538,000, 1 Aug 2012 - 31 July 2015.

- PI, Investigation of blood coagulation time under various parameters, Chang Gung Memorial Hospital, CMRPD2B0011, TW$1,162,755, 1 Aug 2012 - 31 July 2013.

- PI, Development of a thermo-pneumatic actuated immunoassay biochip, Chang Gung University, UERPD2B0121, TW$288,225, 1 Aug 2012 - 31 July 2013.

- PI, Active hybridization and electrical detection in a DNA chip for portable diagnostics, National Science Council, NSC100-2221-E-182-022, TW$660,000, 1 Aug 2011 - 31 July 2012.

- PI, A flexible capacitive normal and shear force sensor for pressure mapping application, Chang Gung University, UERPD2A0101, TW$608,900, 1 July 2011 - 30 June 2012.

- PI, Development of a portable electrical immunoassay device, National Science Council, NSC99-2218-E-182-008, TW$681,000, 1 Dec 2010 - 31 Oct 2011.

Industrial Projects :

- PI, Development of a quantitative evaluation system for spasticity in children with cerebral palsy, Mei Jing Biotechnology Ltd., Taiwan, TW$600,000, 15 July 2019 - 14 July 2020.

- PI, DNA concentration bio-chip, Genvida (HK) Co Limited, Hong Kong, TW$500,000, 1 Mar 2018 - 31 Aug 2019.

- PI, Development of a clinical screening platform for analyzing platelet-rich plasma (PRP), S.H. Medical Co. Ltd., Taiwan and Ministry of Science and Technology, Taiwan, MOST107-2622-E-182-004-CC3, TW$850,000, 1 Nov 2018 - 31 Oct 2019.

- PI, Flexible capacitive pressure sensor, Mei Jing Biotechnology Ltd., Taiwan, TW$200,000, 15 July 2018 - 14 July 2019.

Selected Publications : (Full Publication list)

- Chia-Hao Huang, **Kin Fong Lei***, "Cell Marathon: Long-distance Cell Migration and Metastasis-associated Gene Analysis using a Folding Paper System", Lab Chip,

22:3827-3836, 2022.

- Chun-Hao Huang, **Kin Fong Lei***, "Quantitative Study of Tumor Angiogenesis in Three-dimensional Matrigel Barrier using Electric Impedance Measurement Technique", Sensors and Actuators: B. Chemical, 370:132458, 2022.

- Chia-Hao Huang, Kowit-Yu Chong, **Kin Fong Lei***, "Analysis of the Internal Hypoxic Environment in Solid Tumor Tissue Using a Folding Paper System", ACS Applied Materials & Interfaces, 13:33885-33893, 2021.

- Chun-Hao Huang, **Kin Fong Lei**, "Impedimetric Quantification of Migration Speed of Cancer Cells Migrating along a Matrigel-filled Microchannel", Analytica Chimica Acta, 1121:67-73, 2020.

- Andrew Goh, Chun-Chih Yeh, **Kin Fong Lei**, "Visualization and Quantification of 3D Tumor Cell Migration under Extracellular Stimulation", ACS Applied Bio Materials, 3:1506-1513, 2020.

- **Kin Fong Lei**, Wun-Wu Ji, Andrew Goh, Chun-Hao Huang, Ming-Yih Lee, "Investigation of Uniform Sized Multicellular Spheroids Raised by Microwell Arrays after the Combined Treatment of Electric Field and Anti-cancer Drug", Biomedical Microdevices, 21:94, 2019.

- **Kin Fong Lei**, Andrew Goh, Chun-Hao Huang, "Paper/polymer Composited Microfluidic Platform for Screening Cell Viability and Protein Expression under a Chemical Gradient Environment", Talanta, 205:120124, 2019.

- Chun-Hao Huang, **Kin Fong Lei**, Ngan-Ming Tsang, "Apoptosis and Cell Cycle Arrest of Hepatocellular Carcinoma Spheroids Treated by an Alternating Electric Field", Biotechnology Progress, 35:e2787, 2019.

- **Kin Fong Lei**, Shao-Chieh Hsieh, Andrew Goh, Rei-Lin Kuo, Ngan-Ming Tsang, "Proliferation Arrest, Selectivity, and Chemosensitivity Enhancement of Cancer Cells Treated by a Low-intensity Alternating Electric Field", Biomedical Microdevices, 20:90, 2018.

- Chun-Hao Huang, **Kin Fong Lei**, Ngan-Ming Tsang, "Dissociated Effect and Chemosensitive Enhancement of Tumor Spheroids Influenced by an Electric Field in a Microdevice", Biomedical Microdevices, 20:70, 2018.

- Yung-Chiang Liu, I-Chi Lee, **Kin Fong Lei**, "Toward the Development of an Artificial Brain on a Micropatterned and Material-regulated Biochip by Guiding and Promoting

the Differentiation and Neurite Outgrowth of Neural Stem/Progenitor Cells", ACS Applied Materials & Interfaces, 10:5269-5277, 2018.

- **Kin Fong Lei**, Tai-Kun Liu, Ngan-Ming Tsang, "Towards a High Throughput Impedimetric Screening of Chemosensitivity of Cancer Cells Suspended in Hydrogel and Cultured in a Paper Substrate", Biosensors and Bioelectronics, 100:355-360, 2018.

- **Kin Fong Lei**, Chih-Hsuan Chang, Ming-Jie Chen, "Paper/PMMA Hybrid 3D Cell Culture Microfluidic Platform for the Study of Cellular Crosstalk", ACS Applied Materials & Interfaces, 9:13092-13101, 2017.

- **Kin Fong Lei**, Chich-Hao Kao, Ngan-Ming Tsang*, "High Throughput and Automatic Colony Formation Assay based on Impedance Measurement Technique", Analytical and Bioanalytical Chemistry, 409:3271-3277, 2017.

- **Kin Fong Lei**, Bo-Yuan Lin, Ngan-Ming Tsang, "Real-time and Label-free Impedimetric Analysis of the Formation and Drug Testing of Tumor Spheroids Formed via the Liquid Overlay Technique", RSC Advances, 7:13939-13946, 2017.

- Chih-Hao Chiu, **Kin Fong Lei**, Wen-Ling Yeh, "Development of a Co-culture Device for the Study of Human Tenocytes in Response to the Combined Stimulation of Electric Field and Platelet Rich Plasma (PRP)", Biomedical Microdevices, 19:69, 2017.

- Chih-Hao Chiu, Jun-Liang Liu, Chih-Hsuan Chang, **Kin Fong Lei**, Alvin Chao-Yu Chen, "Investigation of Osteogenic Activity of Primary Rabbit Periosteal Cells Stimulated by Multi-axial Tensile Strain", Biomedical Microdevices, 19:13, 2017.

- Chia-Hao Huang, **Kin Fong Lei**, Ngan-Ming Tsang, "Paper-based Microreactor Array for Rapid Screening of Cell Signaling Cascades", Lab on a Chip, 16:2911-2920, 2016.

- **Kin Fong Lei**, Chia-Hao Huang, Ngan-Ming Tsang, "Impedimetric Quantification of Cells Encapsulated in Hydrogel Cultured in a Paper-based Microchamber", Talanta, 147:628-633, 2016.

- **Kin Fong Lei**, Zong-Ming Wu, Chia-Hao Huang, "Impedimetric Quantification of the Formation Process and the Chemosensitivity of Cancer Cell Colonies Suspended in 3D Environment", Biosensors and Bioelectronics 74:878-885, 2015.

- Lu Liu, Xia Xiao **Kin Fong Lei**, Chia-Hao Huang, "Quantitative Impedimetric Monitoring of Cell Migration under the Stimulation of Cytokine or Anti-cancer Drug in a Microfluidic Chip", Biomicrofluidics 9:034109, 2015.

- **Kin Fong Lei**, Chia-Hao Huang, Rei-Lin Kuo, Cheng-Kai Chang, Kuan-Fu Chen, Kuo-Chien Tsao, Ngan-Ming Tsang, "Paper-based Enzyme-free Immunoassay for Rapid Detection and Subtyping of Influenza A H1N1 and H3N2 Viruses", Analytica Chimica Acta, 883:37-44, 2015.

- **Kin Fong Lei**, Yun-Hsiang Wang, Huai-Yi Chen, Jia-Hong Sun, Ji-Yen Cheng, "Electrokinetic Acceleration of DNA Hybridization in Microsystems", Talanta, 138:149-154, 2015.

- **Kin Fong Lei**, Shih-I Yang, Shiao-Wen Tsai, Hsiao-Ting Hsu, "Paper-based Microfluidic Sensing Device for Label-free Immunoassay Demonstrated by Biotin-Avidin Binding Interaction", Talanta, 134:264-270, 2015.

- **Kin Fong Lei**, Chia-Hao Huang, "Paper-based Microreactor Integrating Cell Culture and Subsequent Immunoassay for the Investigation of Cellular Phosphorylation", ACS Applied Materials & Interfaces, 6:22423-22429, 2014.

- **Kin Fong Lei**, I-Chi Lee, Yung-Chiang Liu, Yu-Chieh Wu, "Successful Differentiation of Neural Stem/Progenitor Cells Cultured on Electrically Adjustable Indium Tin Oxide (ITO) Surface", Langmuir, 30:14241-14249, 2014.

- **Kin Fong Lei**, Min-Hsien Wu, Che-Wei Hsu, Yi-Dao Chen, "Real-time and Non-invasive Impedimetric Monitoring of Cell Proliferation and Chemosensitivity in a Perfusion 3D Cell Culture Microfluidic Chip", Biosensors and Bioelectronics, 51:16-21, 2014.

- **Kin Fong Lei**, Kuan-Hao Chen, Yu-Chen Chang, "Protein Binding Reaction Enhanced by Bi-directional Flow Driven by on-chip Thermopneumatic Actuator", Biomedical Microdevices, 16:325-332, 2014.

- Yen-Heng Lin, Chia-Chu Wang, **Kin Fong Lei**, "Bubble-driven Mixer Integrated with a Microfluidic Bead-based ELISA for Rapid Bladder Cancer Biomarker Detection", Biomedical Microdevices, 16:199-207, 2014.

- **Kin Fong Lei**, Kuan-Hao Chen, Po-Hsiang Tsui, Ngan-Ming Tsang, "Real-time Electrical Impedimetric Monitoring of Blood Coagulation Process under Temperature and Hematocrit Variations Conducted in a Microfluidic Chip", PLoS ONE, 8:e76243, 2013.

- **Kin Fong Lei**, Min-Hsien Wu, Pei-You Liao, Yan Ming Chen, Tung-Ming Pan, "Development of a Micro-scale Perfusion 3D Cell Cultrue Biochip with an Incorporated Electrical Impedance Measurement Scheme for the Quantification of Cell Number in a Cell Culture Construct", Microfluidics and Nanofluidics, 12:117-125, 2012.

- **Kin Fong Lei** and Yoki K.C. Butt, "Colorimetric Immunoassay Chip based on Gold Nanoparticles and Gold Enhancement", Microfluidics and Nanofluidics, 8:131-137, 2010.

- **Kin Fong Lei**, Han Cheng, Kit Ying Choy, and Larry M.C. Chow, "Electrokinetic DNA Concentration in Micro System", Sensors and Actuators A: Physcial, 156:381-387, 2009.

- **Kin Fong Lei**, Syed Ahsan, Nasser Budraa, Wen J. Li and John D. Mai, "Microwave Bonding of Polymer-based Substrates for Potential Encapsulated Micro/Nano Fluidic Device Fabrication", Sensors and Actuators A:Physcial, 114:340-346, 2004.