國立臺灣大學
生醫電子與資訊學研究所

Graduate Institute of
Biomedical Electronics and Bioinformatics,
National Taiwan University

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國立臺灣大學生醫電子與資訊學研究所

Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University

序言 Preface

2020年，COVID-19冠狀病毒蔓延全球，其影響所及，不僅導致諸多生命逝去，亦使各領域發生極大變化。在學術界，各大學院校無不深受影響，除了臺生減少出國進修交流的機會，國際生及交換生亦無法順利來臺就學。為此，本所配合校方的安心就學政策，諸多課程改採遠距方式教學，不僅保障無法入台學生的受教權，也減少了學生之間的接觸，有效控制疾病擴散。

國立臺灣大學身為國內大專院校標竿，有不容忽視的社會責任—積極投入COVID-19冠狀病毒相關研究。生醫電資所身為相關跨領域研究單位，更有義不容辭的義務，協助投入防疫工作。我們以產、官、學密切合作的模式，積極投入藥物、疫苗研究，如曾宇鳳教授與泰福生技、奈力生醫共同開發多項利用重組蛋白或寡肽作為抗原，用於預防或治療COVID-19冠狀病毒之疫苗；阮雪芬教授和AI LAB合作研究老藥新用等，皆是在疫情爆發之初，便已開始組織動員、投注研究資源超前部署之例。

因此今年本所為大專院校相關科系學生所舉辦的「生醫電資營」營隊，特意將活動主題訂為「AI人工智慧超前部署：防疫科技應用」。期望透過教師、醫師、業界之經驗分享，配合專題競賽，針對AI人工智慧科技輔佐防疫之主題進行深入探討，祈能承上啟下，激盪出更多科技應用的可能性，以刺激臺灣學生的自由發展創造力，並提升國際競爭力。

生醫電資所集合師生之力，多年積極投入AI人工智慧研究的結果，終於傳來令人振奮的好消息。教育部於今年八月初，核定本所得增加AI領域招生名額，共計碩士班6名、博士班2名。由於在各領域、產業均積極導入AI技術，以求突破技術瓶頸之時，本所已掌握先機，於數年前便投入相關研究。目前有4項國家級大型AI產學計畫正執行中，包括賴飛羆教授的「臺大醫神—精準醫療人工智慧輔助決策系統」、曾宇鳳教授的「價創計畫：新型治療思覺失調症藥物RS-D7之臨床前安全試驗」、魏安祺教授的「粒線體毒性篩檢整合平台之研發」及我的「應用深度學習於自動乳房超音波電腦輔助偵測與診斷」等。此成就為台灣學界之翹楚，顯見本所教師近年專精於生技醫療AI技術之研發，已於此領域佔有舉足輕重之位。本所身為生技醫療產業的領航研究先驅，對於高階研究人才需求若渴，在相關人才不斷投入研究發展的現況下，得獲增加招生名額，就像一場及時雨，為AI生醫資訊技術的研發與應用研究注入一劑強心針。

除此之外，本所於今年四月份完成了五年一度的教學評鑑。我們邀請到中央研究院陳仲瑄院士擔任評鑑委員，為我們提供寶貴的意見及建議。在陳院士的鼓勵及肯定之下，本所力求精益求精，短時間內已完成數項改革，例如在課程方面，為鼓勵學生適性學習、減輕學生修課負擔，我們降低了逕修博士學生之畢業學分、一般碩、博士學生之必修課修課學期亦下修調整。在師資方面，我們積極招募新聘教師，以充實本所師資、拓寬教學研究領域，於今年八月已完成新聘一位教授。劉浩澧教授自本校畢業後，前往美國哈佛大學擔任博士後研

究員，並於今年加入台大任教。劉教授在治療超音波領域上有多項前瞻研究及傑出期刊發表，並成為第一位、也是唯一一位榮獲國際超音波學會Ferderic Lizzi Award之亞洲學者。相信劉教授的專業能為學生帶來最尖端的知識，提升本所於國際上的知名度與影響力。

台大生醫電資所創所十餘年來，因應生物科技的快速發展，並配合政府政策與發展方針，本所始終自許應在前瞻科技創新領域搶佔先機，引領研究風向，並對於國家經濟發展做出具體貢獻。如今，本所碩、博士班研究生，不僅在教學上已有完整AI課程學習；在頂尖教授之指導下，亦透過執行大型AI產學計畫，獲得學習及實作最新的醫療AI技術。我們有系統地朝向目標前進，期許本所能夠成為國內生醫電子與資訊AI領域最具領導力的創新研發要角。而在COVID-19疫情全球延燒的當下，我們亦將帶著希望，發揮科技人的智慧和力量，從各方面協助疫情控制。期望在不久的將來，便能有更多鼓舞人心的正面訊息傳來，帶給疫情中的人們一絲曙光，終結疫災。

張瑞峰

2020年10月

序言 Preface

In 2020, it has been a tough pill to swallow. Due to the coronavirus disease (COVID-19) outbreak evolving rapidly worldwide, increasing infected people, and many deaths, dramatic changes occurred in various fields. Furthermore, the effects of COVID-19 on academic activities have decreased Taiwanese students' opportunity to study abroad and caused international and exchange students unable to join the university this semester. For this, the Graduate Institute of Biomedical Electronics and Bioinformatics (abbreviated as BEBI) has been dedicated to following the school's policy and have switched to alternative forms of teaching like remote courses. We thereby secured students' rights to be educated and reduced physical contact to increase epidemic prevention efficiency.

National Taiwan University, the benchmark among the academic and university in Taiwan, has the social responsibility to engage in research related to the COVID-19 pandemic during this challenging time. As an interdisciplinary research unit, It is incumbent on our institute to assist the epidemic prevention work of the COVID-19. Through the collaborations with the combination of industry, official, and university, actively invest in drug and vaccine research, e.g., one of the successful co-development was Professor Y. Jane Tseng, who cooperated with Tanvex BioPharma Inc, and Nano Targeting & Therapy BioPharma Inc. They reconstructed the protein or the oligopeptide as antigens, which could be served as vaccines to cure and prevent the spread of COVID-19. Apart from that, an experienced and professional team which consisted of Professor Hsueh-Fen Juan and AI LAB has conducted drug repurposing studies. These cases are the exemplar which had deployed resources on research ahead of the outbreak of COVID-19.

Thus, "Prevention measures of Artificial Intelligence: Applications of the epidemic prevention technologies" was the title of our institute's "BEBI camp," the event organized for related science and technology students in colleges and universities held by our institute this year. With the sharing of experiences of teachers, physicians, and the industry, in conjunction with thematic competitions, the students are in-depth comprehensively conducted discussions on AI artificial intelligence technology assisting in epidemic prevention. It is hoped that it will form a connecting link between the preceding and the following to stimulate students' creativity and enhance their international competitiveness.

After actively investing in the AI research field, our institute obtains the encouraging and fruitful result with everyone's efforts. At the beginning of this August, the Ministry of Education (MOE) approved our institute could increase the master's and doctoral degrees' admission quota by 6 and 2 in the AI field. Our institute seized the opportunity to advance research when all fields and industries are actively developing AI technology to continuously breakthrough technology. The four national large-scale AI projects include NTU Medical Genie: AI Decision Support System for Precision Medicine directed by Prof. Fei-Pei Lai, Industrial Value Creation Program for Academia: A Novel Drug, RS-D7, for the Treatment of Schizophrenia - Preclinical Safety Studies directed by Prof. Y. Jane Tseng, Integrative Platform of Mitochondrial Toxicity Screening directed by Prof. An-Chi Wei's and, Automated Breast Ultrasound Computer-aided Detection and Diagnosis Using Deep Learning directed by Director Ruey-Feng Chang, etc. From the accomplishments mentioned above, our institute is a renowned institution in Taiwan Academic. It is evident that our teachers have been specialized in the research and development of biotechnology and medical AI technology in recent years, and they have taken a pivotal position in this field. As a research pioneer in the biotechnology and medical industry, we are yearning for a senior researcher. Hence, the adjustment of the MOE admission quota was indeed a

piece of encouraging news for us. With more desired researchers joining in, researches on the applied sciences and AI bioinformatic technologies will doubtlessly be invigorated.

Besides, our institute completed the five-year teaching evaluation in April this year. Academician Chung-Hsuan Chen from the Academia Sinica was invited as an evaluator. Under his endorsement and encouragement, several reformations have been accomplished ere long. One of them includes lowering the graduation requirement for students pursuing directly admitted doctoral degrees in consideration of fewer burdens in courses, taking and encouragement in adaptive learning, and benefitting alterations to the compulsory course requirements for graduate students are also in progress. To enrich our institute's faculty and the diversification of research areas, we newly recruited a resourceful professor right in August this year. After graduating from the National Taiwan University, Professor Hao-Li Liu pursued his study as a postdoctoral researcher at Harvard University and joined National Taiwan University this year. Besides, Professor Hao-Li Liu is the first and only Asian scholar to receive the Frederic Lizzi Award after achieving marvelous research results and having outstanding works published about the therapeutic ultrasound. It is believed that Professor Liu's major could impart cutting-edge technology to students and improve our institute's national recognition and influence.

Over the past ten years, after our institute was established, our institute responds to biotechnology's rapid development and follows government policies and development guidelines. Our institute always aspires to our department to seize the opportunity in forward-looking technological innovation, lead the research trend, and make specific contributions to national economic development. Nowadays, our institute has complete AI courses for our masters and doctoral students. Under professors' guidance, students could also learn and implement the latest medical AI technology by implementing large-scale AI industry-university projects. To become the leading innovative research team in AI Biomedical Electronics and Bioinformatics's domestic field, we have worked methodically towards our goal. As the COVID-19 epidemic spreads globally, we will keep our faith with hope. Give full play and Technologist's wisdom to assist in epidemic control from all aspects. Hopefully, there are more encouraging messages coming, bringing positive energy to people in the epidemic, and ending the epidemic be just around the corner.

October 2020

目錄 Contents

壹 生醫電子與資訊學研究所簡介
Introduction of BEBI

國立臺灣大學生醫電子與資訊學研究所（簡稱生醫電資所）於 2006 年 8 月 1 日正式成立，本所的獨特性在於生物醫學、電機與資訊三大領域的結合，進行生物醫學之前瞻研究及跨領域教學。換言之，生醫電資所的主要使命在於提升跨領域的研究及教學，以因應生物醫學科技的快速發展，這些領域有：生醫電子、分子 / 細胞 / 組織影像、生醫訊號處理、生醫光電、感測器、生醫晶片、電腦輔助診斷、生物資訊學、系統生物學以及醫學資訊學等，為了在此專業領域中追求卓越，並謀求進一步的研究合作，整合來自不同領域的專業是相當必要的。

2006 年 8 月，生醫電資所開始招收博士班，目前每年招收 16 名博士生加入生醫電資所的行列，碩士班也於 2007 年 8 月開始招生，每年有 48 名碩士新生加入。本所有 35 位教師，來自不同領域的背景，包含了電機工程、資訊科學、生物、藥學、生醫工程、醫學以及生命科學。本所的課程設計也提供學生有足夠的跨領域訓練，以迎合生物醫學科技此一領域的挑戰，目前，我們針對重要的生醫問題進行整合性的研究，同時也和生醫電子及生物資訊相關產業合作，及進行跨領域的訓練和教育，我們期待本所持續的成長茁壯，並對生物科技與健康照護領域做出貢獻。

The Graduate Institute of Biomedical Electronics and Bioinformatics (BEBI) at National Taiwan University was formally founded on August 1, 2006. In a way, it is a very unique institute among those in College of Electrical Engineering and Computer Science, National Taiwan University, in that the fields of expertise are diversified but our efforts remain extremely focused. The main mission of the institute is to promote interdisciplinary research and education in respond to the rapid advancement of biotechnology. In this regard, the following areas have been identified as our focus areas which we have been putting our major efforts in: Biomedical Electronics, Molecular/Cellular/Tissue Imaging, Biomedical Signal Processing, Biophotonics, Sensors, Microarray and Next generation sequencing analyses, Computer-Aided Diagnosis, Bioinformatics, Systems Biology and medical Informatics. To excel in these areas and to bring up research synergy, integrative efforts from different disciplines are necessary.

The BEBI institute started the doctoral program in August, 2006 and now we admit 16 new Ph.D. students every year. Our master program started in August, 2007 with 48 new students entering the institute annually. There are 35 faculty members, among those 8 are with primary appointments. As our main mission mandates, our faculty members come from different trainings, including electrical engineering, computer science, biology, pharmacy, biomedical engineering, medicine and life sciences. Our curriculum is also designed to provide students with sufficient cross-disciplinary training to meet the challenges in biotechnology. Currently resources are used to promote integrated research projects aiming at important biomedical problems, collaboration with local industry in biomedical electronics and bioinformatics, as well as multidisciplinary training and education. As a result, research teams have been formed and several integrated program projects are underway. New courses have also been developed and a core lab is also being established to provide students with hands-on training. We look forward to continuing growth and contributions to this exciting field of biotechnology.

貳 研究領域 Research Fields

一、生醫電子組 Biomedical Electronics Group

本組研究主題涵蓋醫學影像、醫療儀器與生醫信號處理、生物晶片與生醫微感測器、生醫光電、生醫系統工程等數個領域。在醫學影像方面，研究重點係針對核磁共振與超音波造影技術，提升影像的品質、速度與功能性，並發展分子影像技術，應用於臨床醫學診斷、治療以及神經認知科學等方面。在醫療儀器與生醫信號處理方面，重點為開發或利用現有的醫療儀器，擷取各種生理訊號，並透過數位信號處理技術，提供醫療人員有效之疾病診斷及生理監測資訊。生物晶片的研究重點包 DNA 微陣列晶片之製程、感測技術與資料分析方法，以及以光電蝕刻技術控制生物分子、細胞及微組織之排列，並將其應用於生物醫學之研究。在生醫微感測器方面，主要為發展表面電漿共振光學檢測技術與利用標準半導體製程方式，進行生物分子的感測，並進一步將檢測元件微小化。在生醫光電領域，發展高解析度光學顯微影像以及各種光譜技術，提供生物分子、細胞與組織的分析、成像與操控工具，進而輔助疾病的診斷與生醫相關的研究。在生醫系統工程領域，結合生物醫學資訊，量化生理現象，透過系統模擬與工程設計，促進生物醫學發展及疾病治療。

Faculty members in this group have diverse research interests including “medical imaging”, “medical instrumentation and biomedical signal processing”, “biochips and biomedical sensors”, “biomedical optics”, and “biomedical systems engineering”. In the area of “medical imaging”, research efforts are focused on magnetic resonance imaging (MRI) and ultrasound imaging techniques. The goals are to improve the quality, acquisition speed and functionality of imaging, as well as to apply these techniques for diagnosis and treatment of disease. In the area of “medical instrumentation and biomedical signal processing”, digital signal processing techniques are used to extract information that is useful for diagnosis or monitoring of physiological status. Research efforts in the area of “biochips and biomedical sensors” are focused on improving the manufacture and detection of DNA and protein microarrays, arranging biomolecules and culture tissue using micro-patterning techniques, development of new data analysis methods for DNA microarrays, and development of miniature biosensors based on surface plasmon resonance (SPR) and nanowire biomolecular sensing devices based on standard CMOS fabrication. The emphasis of research in “biomedical optics” is to use optical microscopy, nanoscopy and spectroscopy techniques to detect, image, analyze, and manipulate biological molecules, cells, and tissues. The ultimate goal is to provide information relevant to diagnosis and useful tools for the general biomedical research community. The biomedical systems engineering group integrates biomedical informatics, computer modeling and simulation and systems engineering to quantify and understand the biological and physiological phenomenon. The goal is to advance the biomedical sciences and to improve the understand and treatment of diseases.

二、生醫資訊組 Bioinformatics Group

本組研究主題為「生醫資料分析與探勘」、「計算系統生物學」、「計算藥物學及化學」以及「醫學資訊系統」。在生醫資料分析與探勘方面，研究重點包括生物晶片 (微陣列) 和次世代定序資料分析、DNA 與蛋白質序列分析、基因及蛋白質結構與功能分析、生醫資料探勘等。在計算系統生物學方面，研究重點則是針對複雜的生物系統，建構數學分析及模擬計算的模型，以作為分析及模擬尖端生物醫學及生命科學現象的基礎。在計算藥物學及計算化學部分，則針對藥物及疫苗開發所涉及的量子化學計算及化學動力學計算建構新的計算模型以及設計更有效率的演算法。在醫學資訊系統方面，研究主題涵蓋層面極廣，包括醫學資訊應用所涉及的網路、多媒體與資料庫系統，以及平行運算、分散式和即時計算等。

We dedicate our resources to cutting-edge topics such as "biomedical data analysis and mining", "computational systems biology", "computational pharmacology and chemistry", and “medical information systems”. Our major research interests in biomedical data analysis and mining include biochip (microarray) and next generation sequencing data analysis, DNA and protein sequence analysis, gene and protein structure and function analysis, as well as biomedical data mining. In the area of computational systems biology, we focus on developing advanced mathematical models and simulation methods to describe the operations and behaviors of complex biological systems. Our research on computational pharmacology and chemistry aims to design novel computational models and efficient simulation algorithms for quantum chemistry and molecular dynamics to facilitate drugs and vaccine development. In medical information systems, we cover a wide range of topics on developing information technologies for medical applications, including networking, multimedia, database, parallel processing, distributed and real-time computing.

參 新進教師介紹
New Faculty

劉浩澧 教授
Hao-Li Liu, Professor

劉浩澧博士在 2003 年取得國立臺灣大學電機工程博士學位。於 2004-2005 年期間，任職於美國波士頓哈佛大學醫學院 / Brigham & Womens Hospital 放射科系擔任博士後研究員，從事治療超聲醫療儀器開發。於 2005-2020 年間任職於長庚大學電機系、並於 2020 年起加入國立臺灣大學生醫電子與資訊學研究所。劉浩澧博士目前繼續研究治療用超音波之醫療器材技術開發，超音波輻照對血腦屏障（BBB）開啟進行大腦藥物輸送，超音波相位陣列設計等研究議題。劉博士在治療超音波領域發表了超過 120 篇之 SCI 論文（包含 2 篇被高引用論文）、獲得超過 40 件全球專利。於 2011 及 2018 年，分別獲頒臺灣科技部吳大猷先生紀念獎、科技部傑出研究獎、及科技部傑出技轉貢獻獎。在國內。陸續榮獲電機工程學會優秀青年電機工程師獎及、永信李天德基金會青年醫藥科技獎、及有庠科技發明獎。在國際，曾榮獲國際超音波學會頒發 Ferderic Lizzi Award，為第一位獲頒此獎之亞洲唯一學者。

Hao-Li Liu received the Ph.D. degrees in Electrical Engineering in 2003 from the National Taiwan University, Taipei, Taiwan. In 2004-2005, He was the research fellow of the Department of Radiology, Brigham and Women’ s Hospital, Harvard Medical School, Boston, MA, USA. He is currently the Professor and the Director of Department of Electrical Engineering, Chang-Gung University, Taoyuan, Taiwan, and also the Adjunct Assistant Researcher of Division of Medical Engineering Research, National Health Research Institutes, Miaoli, Taiwan. Dr. Liu is currently continuing research in ultrasound thermal therapy and its treatment planning/ simulation, ultrasound-induced blood brain

barrier (BBB) disruption for brain drug delivery, ultrasound phased array design. Dr. Liu has published over 130 SCI papers, over 40 worldwide patents been filed in areas of biomedical use of therapeutic ultrasound. He received the Distinguished Tech-Coop Award and the Distinguished Research Award from Chang-Gung University, respectively. Also in 2011, He received the Wu Ta-You Memorial Award from the National Science Council in Taiwan. In 2013, he received the Frederic Lizzi Award from the International Society for Therapeutic Ultrasound (ISTU) and also the Excellent Young Electrical Engineer Award from the Chinese Institute of Electrical Engineering to acknowledge his significant research contributions to therapeutic ultrasound. In 2015, as the first engineering-background honoree, Dr. Liu received the TienTe Lee Award to recognize his contribution on integrating medicine and engineering. In 2017 and 2018, he received the Academic Research Award from the Ministry of Science and Technology, Taiwan. Dr. Liu is a senior member of IEEE and previously served as the board member in the International Society of Therapeutic Ultrasound (ISTU) and Taiwan Association of Interventional & Therapeutic Ultrasound (TAITU).

肆 學術活動 Academic Activities

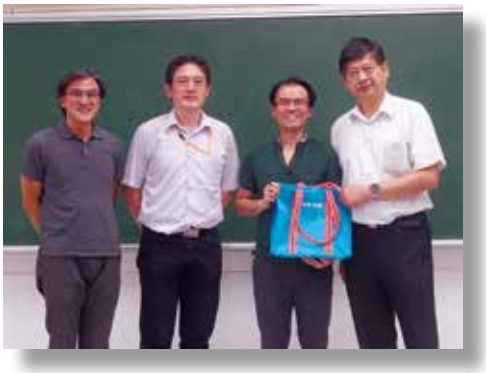
一、演講 Lectures

日 期	講 者	講 題
2019.09.16	台北市消防局金華分隊 朱春成小隊長	火災預防、災害搶救、案例分享
2019.09.23	國立台灣大學醫學院 倪衍玄院長	Gut Microbiota in Human Diseases
2019.09.30	Arlington Innovation Center, Physics Department, Virginia Tech, Arlington, VA Radiology and Oncology Department, Georgetown University, Washington, DC 婁世鐘教授	Transformation-identical CNN (TI-CNN) and Geared Rotation-identical CNN (GRI-CNN) and Their Variants for Orientation-Independent Pattern Classification.
2019.10.07	台大寫作教學中心 江介維講師	學術英文寫作思維
2019.10.14	聯發科技股份有限公司 陳柏諭技術副理	Edge AI and NeuroPilot Platform
2019.10.21	美國加州大學爾灣分校 (UCI) 醫學院功能性腫瘤影像中心 Dr. Gordon Chen, M.D.	Imaging Breast Density: Established and Emerging Modalities
2019.10.28	Department of Radiology and Nuclear Medicine, Radboud university medical center, Nijmegen Prof.Nico Karssemeijer	AI in breast imaging
2019.11.11	工研院巨量資訊科技中心 馮文生博士	AI Technologies and Applications in Healthcare
2019.11.18	臺大醫院教學部 盛望徽主任	感染性疾病分子檢測新發展
2019.11.25	華碩電腦股份有限公司 吳漢章總經理	人工智慧與醫療數位轉型 - Medical AI 的系統發展觀
2019.12.02	台大醫院醫研部 陳建煒主任	Data, Ethics, and Methods in Clinical Research, how information technology may help

2019.12.09	仁寶電腦 陳坤松處長	體醫結合，掌握健康時代的商業思維
2019.12.16	企業參訪：廣達電腦	
2019.12.23	臺大醫學教育暨生醫倫理學科暨 研究所 蔡甫昌主任	大數據及 AI 醫療運用的倫理議題
2020.03.09	台大寫作教學中心 張晨講師	Present with Charisma
2020.03.16	BMCC 生醫商品化中心 / 藥品領域 BioMed Commercialization Center 王勝鋒資深經理	生醫大未來
2020.03.23	雲象科技股份有限公司 (aetherAI) 葉肇元共同創辦人暨執行長	Advancing Medical Imaging with Artificial Intelligence
2020.03.30	國立清華大學電機工程學系 劉奕汶副教授 美國史丹佛大學電機博士	從古典音樂看機器聽覺的若干問題
2020.04.20	中國醫藥大學 劉彥良助理教授	Applications of single-particle tracking in visualizing EGFR trafficking and assessing the metastatic potential of cancer cells
2020.04.27	台灣房屋集團樂齡事業中心 高燕彬執行長	從高齡長照服務來探索銀髮科技應用
2020.05.04	緯創資通智慧醫療事業 郭志峰總監	智慧醫療科技趨勢及應用案例分享
2020.05.11	臺北醫學大學藥學院 張偉嶠副院長	基因體科技與精準藥學
2020.06.01	國家高速網路與計算中心 應用開發服務組 王聿泰組長	生醫巨量資料時代下所面臨的資訊科技挑戰
2020.06.08	台大醫院 吳明賢副院長	巨量資料、精準醫學和數位健康時代的 健康照護與研究：挑戰與機會

2019.09.23
國立台灣大學醫學院倪衍玄院長
「Gut Microbiota in Human Diseases」

2019.10.14
聯發科技股份有限公司陳柏諭技術副理
「Edge AI and NeuroPilot Platform」

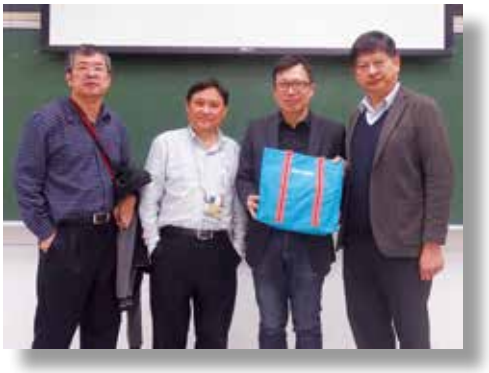


2019.10.28
Department of Radiology and Nuclear Medicine, Radboud university medical center, Nijmegen
Prof.Nico Karssemeijer 「AI in breast imaging」

2019.11.18
臺大醫院教學部盛望徽主任
「感染性疾病分子檢測新發展」

2019.11.25
華碩電腦股份有限公司吳漢章總經理
「人工智慧與醫療數位轉型-Medical AI的系統發展觀」

2019.12.02
台大醫院醫研部陳建煒主任
「Data, Ethics, and Methods in Clinical Research, how information technology may help」

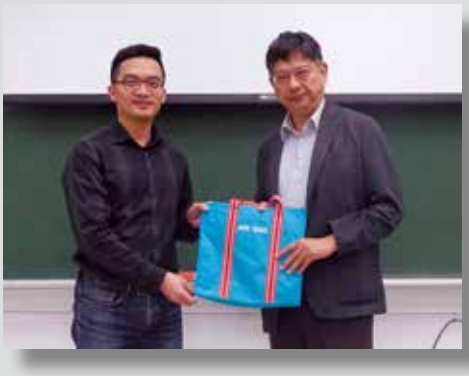


2019.12.09
仁寶電腦陳坤松處長
「體醫結合，掌握健康時代的商業思維」

2019.12.16 企業參訪：廣達電腦

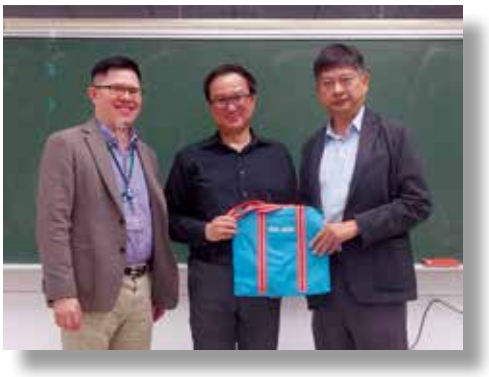
2019.12.23
臺大醫學教育暨生醫倫理學科暨研究所蔡甫昌主任
「大數據及AI醫療運用的倫理議題」

2020.03.16
BMCC生醫商品化中心/藥品領域王勝鋒資深經理
「生醫大未來」



2020.03.23
雲象科技股份有限公司（aetherAI）
葉肇元共同創辦人暨執行長
「Advancing Medical Imaging with Artificial Intelligence」

2020.04.20
中國醫藥大學劉彥良助理教授
「Applications of single-particle tracking
in visualizing EGFR trafficking and assessing the
metastatic potential of cancer cells」



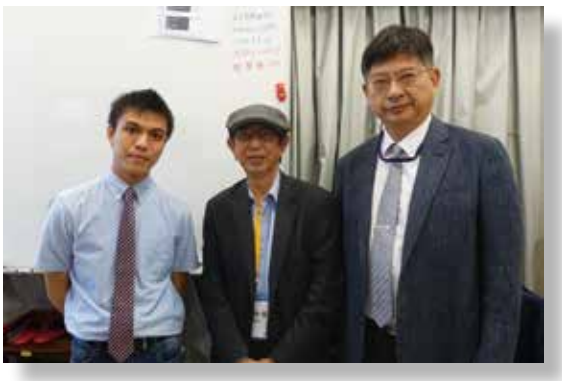
2020.04.27
台灣房屋集團樂齡事業中心高燕彬執行長
「從高齡長照服務來探索銀髮科技應用」

2020.05.11
臺北醫學大學藥學院張偉嶠副院長
「基因體科技與精準藥學」

2020.06.01
國家高速網路與計算中心應用開發服務組王聿泰組長
「生醫巨量資料時代下所面臨的資訊科技挑戰」

2020.06.08
台大醫院吳明賢副院長
「巨量資料、精準醫學和數位健康時代的
健康照護與研究：挑戰與機會」

二、 國立臺灣大學 108 學年度教學研究單位評鑑
2020 Evaluation of Teaching Research Units of National Taiwan University



2020.04.29 實驗室訪視：明達館 702 實驗室

2020.04.29 實驗室訪視：明達館 703 實驗室

2020.04.29
實驗室訪視：
德田館 346 實驗室

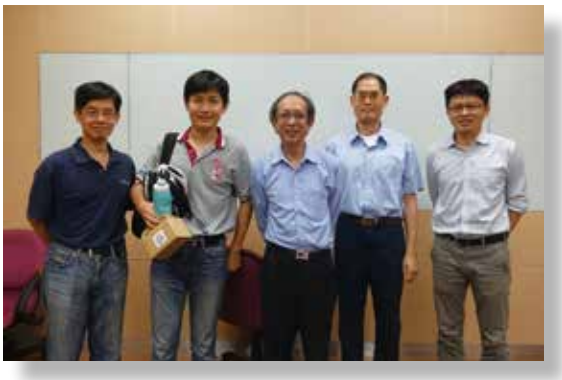
2020.04.29-30 評鑑委員與系所主管大合照

2020.04.29 實驗室訪視：德田館 402 實驗室

2020.04.29 評鑑委員與學生座談：
電子組及資訊組博士班

2020.04.29 評鑑委員與學生座談：電子組碩士班

2020.04.29 評鑑委員與學生座談：資訊組碩士班



2020.04.30 評鑑委員與教師座談：電子組教師

2020.04.30 評鑑委員與教師座談：資訊組教師

三、國立臺灣大學電機資訊學院108年度畢業典禮
2020 Commencement of College of Electrical Engineering and Computer Science, NTU

四、 2020/09/03-09/04生醫電子資訊營
Biomedical Electronics and Bioinformatics Camp on September, 03-04, 2020

2020年臺大生醫電資營於9月03日至9月04日假臺大博理館演講廳舉辦，今年的主題為「AI人工智慧超前部署，防疫科技應用」，2020年初新冠肺炎疫情全球延燒，台灣疫情比起許多國家相對趨緩。除了產、官、學界密切合作協力防堵疫情擴大，更於網路應用、藥物疫苗、快篩技術研發上嶄露頭角。本活動希望透過教授與業界講師、醫師的引領，配合專題競賽的模式，以防疫科技為出發點，並結合近年來AI人工智慧的科技浪潮，彼此激盪出更多可能性，同時也透徹了解本所與生醫領域當前致力發展的研究與應用。

今年我們採用專題競賽的活動，給予各組一個專業領域的大方向，讓他們根據這個方向發想一個待解決的問題，並且提出可行的解決辦法，同時製作出解決的雛型裝置。在活動的最後一天，各組都成功地將他們這二天所發想的解決辦法以及產品原型以海報方式展現出來，亦獲得了評審們的高評價。

本次活動總計有80位學員報名參加，成員主要多為本所的新生，同時也有許多電機、生物相關科系

的大學生來參與。在學員的問卷調查中，非常滿意本次的營隊規劃、願意再參加，也願意推薦給其他人，並對講者的演講都有很高的評價。明年本所亦將視培養國家未來生醫電子與資訊人才為己任，繼續舉辦生醫電資營。

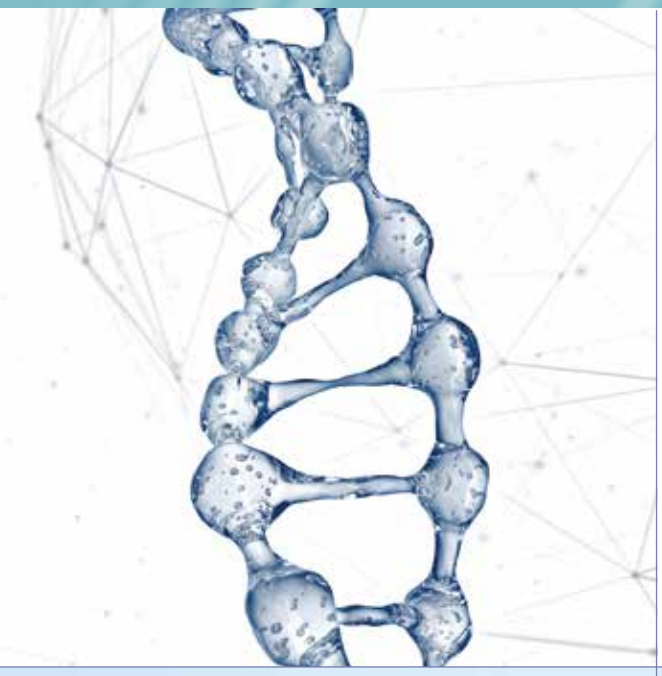
The 2020 National Taiwan University Biomedical Electronics and Bioinformatics Camp was held from 3th September to 4th September at the Barry Lam Hall in National Taiwan University. The topic this year is "Advance deployment of artificial intelligence and application of epidemic prevention technology".

At the beginning of 2020, the COVID-19 fever spread globally, and the epidemic in Taiwan is relatively slower than in many countries. In addition to the close cooperation between industry, government, and academia to prevent the spread of the epidemic, it has also emerged in Internet applications, drug vaccines, and rapid screening technology research and development. This activity hopes that through the guidance of professors, industry lecturers, and physicians, and the mode of thematic competition, with epidemic prevention technology as the starting point, combined with the technological wave of artificial intelligence in recent years, more possibilities will be stirred up by each other, and at the same time, we will have a thorough understanding of current research and application in the field of biomedicine.

The activity was divided into two sections, where we explored the series of lectures from different aspects.

This year we conducted a thematic competition. First, we gave each group the big picture of a professional field, then we let each group to find a problem according to the given topic and come up with the solution and create a prototype device to solve the problem. On the last day of this activity, each group successfully displayed their solutions and prototype thought in form of poster in the past three days, which received high review comments by the spectators.

There were a total of 80 participants attended this activity, some are the freshmen of our institute, other participants are under graduate students from different university all over the country in electrical engineering, biology and other related major. Based on the questioner, the participants are mostly satisfied with the event, willing to participate again and to recommend the event to others, and they also give high review to the lectures. Based on this highly rated feedback, we will continue to hold this camp to take part in the cultivation of future talent next year.



Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University

伍 生醫核心實驗室
Biomedical Core Laboratories

永齡生醫工程館─生醫核心實驗室 YongLin Biomedical Engineering Hall

永齡生醫工程館自民國 97 年受鴻海集團郭台銘先生及其所屬之永齡健康基金會之捐贈而開始籌建，目的在於建構一處生醫研究基地，而橫跨生醫、電子、資訊等三領域為一體的本所在積極爭取之下，受有七樓一層。民國 102 年，本所雖已有規劃之雛形，所內也有著建置實驗室的共識，但為妥善運用空間，並務求資源能公平、透明的分配予本所全體師生，我們先於 103 年 6 月成立任務型空間規劃委員會，爭取時間討論規劃，同年 8 月便交由新學年之正式空間規劃委員接力運作，擘畫空間、設立規範，全所共用之「生醫核心實驗室」與「高速運算中心」便在此時集結眾人之心力逐步成形。

歷經數百個日子的醞釀，生醫核心實驗室率先於 104 年暑假動工，終於趕在 104 年 11 月正式落成，得以在新的學年為師生們提供服務。生醫核心實驗室的規劃是以長期提升本所研究能量為指標而建置，所以在儀器規格、實驗室內裝配置以及操作規範上，都是以極為嚴謹的態度進行全盤考量。為顧及所內眾多師生不同的實驗需求，一般生物實驗室所需的儀器設備在此皆甚為齊備，例如：整齊安全的工作檯、排氣櫃、細胞離心機等儀器，我們更在實驗室內部規劃了生物安全等級第二級（BSL2）的區塊，設有細胞培養室、生物安全操作櫃等設備，同時更透過實驗室使用規範控管使用者的安全，藉由嚴格遵守相關規範來保障本所最寶貴的人才資產。

本所自 2006 年成立，一路走來受到諸多資源挹注，因此，生醫核心實驗室不僅提供本所師生申請使用，同時也將秉持最開放的態度接受全校師生的借用，讓有限的資源在共享之下得以發揮最大的價值。我們相信生醫核心實驗室在全所的努力與運作下，將能持續茁壯成為國內生醫研發人才與技術的搖籃之一。

YongLin Biomedical Engineering Hall was constructed in 2008 through the generosity of Mr. Tai-ming Guo from Honghai Corporation and its YongLin Health Foundation, with the goal of building a base for biomedical research. After continuous effort, our department, encompassing backgrounds ranging from biomedical to electronics and IT, has secured the entire seventh floor.

In 2013, although we already had done initial planning and had mutual agreement on setting up laboratories, we formed the "space allocation temporary committee" for detailed discussion of proper utilization of space and equal sharing of the resources among all members in the department. In August of 2014, the "committee of space allocation" took over the work of outlining the partition of space and set up usage clauses. During this period, the Biomedical Core Laboratory and High Performance Computing Center started to take shape.

Hundreds of days in the making, the Biomedical Core Lab was the first to be constructed in the summer of 2015. It was completed in November of the same year, just in time to provide service in the new academic year. The Biomedical Core Lab was designed for long-term use. Thus, the specifications of the equipment and configuration of the lab interior have been handled with the greatest care. To fulfill the different requirements of all types of experiments, all the equipment commonly found in an average biology lab, such as workbenches, exhaust cabinets, and centrifuges, are provided. We also set apart a specific region in the lab for with BSL2-grade safety which contains the cell culture room and biological safe operation cabinet. Strict usage clauses are enforced to ensure the safety of all users.

Ever since the birth of our department in 2006, we have had the luxury of receiving resources from all directions. Therefore, the Biomedical Core Lab will not only serve teachers and students of this department, but also do its best to share such resources with members of the whole school, exercising them to their greatest value. We are confident that this lab will never cease to grow and become one of the greatest sources of biomedical talent.

生醫核心實驗室

陸 實驗室及教師
Laboratories and Faculty

生醫電子組實驗室 Laboratory of Biomedical Electronic Group

實驗室名稱 Name	主持教授 Advising professor	地點 Room
超大型積體電路系統晶片電腦輔助設計實驗室 SOC VLSI-EDA Lab.	陳中平 Chung-Ping Chen	博理館 405 室 Room 405, Barry Lam Hall
醫學影像實驗室 / 磁共振影像頻譜實驗室 / 生醫分子影像核心實驗室 Medical Imaging Lab./Magnetic Resonance Imaging Lab./Biomedical Molecular Imaging Core Lab.	陳志宏 Jyh-Horng Chen	明達館 706 室 Room 706, MingDa Building
放射物理生物實驗室 Radiation Physics and Biology Lab.	成佳憲 Chia-Hsien Cheng	臺大醫院 NTUH
生物晶片研究室 Bioinformatics and Biostatistics Core Lab.	莊曜宇 Eric Y. Chuang	明達館 701 室 Room 701, MingDa Building
光流體生醫系統實驗室 Bio-Optofluidic Systems Lab.	黃念祖 Nien-Tsu Huang	明達館 702 室 Room 702, MingDa Building
醫用磁振造影研究室 Magnetic Resonance in Medicine Lab.	鍾孝文 Hsiao-Wen Chung	明達館 704 室 Room 704, MingDa Building
電子束暨奈米元件實驗室 E-beam and NanoDevice Lab.	管傑雄 Chieh-Hsiung Kuan	電機二館 426/129 室 Room 426/129, EE 2
細胞行為實驗室 Cell Behavior Lab.	郭柏齡 Po-Ling Kuo	明達館 707 室 Room 707, MingDa Building
統計信號處理實驗室 Statistical Signal Processing Lab.	李枝宏 Ju-Hong Lee	電機二館 553 室 Room 553, EE 2
超音波影像實驗室 Ultrasonic Imaging Lab.	李百祺 Pai-Chi Li	明達館 731 室 Room 731, MingDa Building

實驗室名稱 Name	主持教授 Advising professor	地點 Room
內皮細胞分子生物學實驗室 Laboratory of Endothelial Cell Molecular Biology	李心予 Hsinyu Lee	生命科學館 504 室 Room 504, Life Science Building
生醫晶片系統實驗室 Bio-Electronics-System Technology Lab.	林致廷 Chih-Ting Lin	電機二館 450 室 Room 450, EE 2
醫用微感測器暨系統實驗室 Medical Micro Sensor and System Lab.	林啟萬 Chii-Wann Lin	永齡生醫工程館 526 室 Room 526, YongLin Biomedical Engineering Hall
生物系統介入控制實驗室 Interventional Biosystem Control Lab	劉浩澧 Hao-Li Liu	電機二館 237 Room 237, EE 2
光學分子影像核心實驗室 Optical Molecular Imaging Core Lab.	孫啟光 Chi-Kuang Sun	電機二館 R406A 室 Room R406A, EE 2
生醫光譜與影像實驗室 Biomedical Optical Spectroscopy and Imaging Lab.	宋孔彬 Kung- Bin Sung	明達館 703 室 Room 703, MingDa Building
中研院生醫所 IBMS RM511	楊泮池 Pan-Chyr Yang	臺大醫院 NTUH
超解析光學影像實驗室 Light Nanoscopy Lab.	楊東霖 T. Tony Yang	明達館 615 室 Room 615, MingDa Building
台大醫院第七共同研究室 Laboratory	周迺寬 Nai-Kuan Chou	臺大醫院 NTUH
生醫系統工程實驗室 Biomedical System Engineering Lab.	魏安祺 An-Chi Wei	明達館 705 室 Room 705, MingDa Building

生醫資訊組實驗室 Laboratory of Bioinformatics Group

實驗室名稱 Name	主持教授 Advising professor	地點 Room
醫學影像處理實驗室 Medical Image Processing Lab.	張瑞峰 Ruey-Feng Chang	德田館 402 室 Room 402,CSIE Building
演算法與計算生物學實驗室 Algorithms and Computational Biology Lab.	趙坤茂 Kun-Mao Chao	德田館 432 室 Room 432,CSIE Building
數位相機與電腦視覺實驗室 Digital camera and Computer Vision Lab.	傅楸善 Chiou-Shann Fuh	德田館 328 室 Room 328,CSIE Building
	黃俊升 Chiun-Sheng Huang	臺大醫院 NTUH
系統生物學研究室 Systems Biology Lab.	阮雪芬 Hsueh-Fen Juan	生命科學館 1105 室 Room 1105,Life Science Building
醫學資訊實驗室 Medical Informatics Lab.	賴飛羆 Fei-pei Lai	德田館 346 室 Room 346, CSIE Building
分子生醫資訊實驗室 Molecular Biomedical Informatics Lab.	歐陽彥正 Yen-Jen Oyang	德田館 410 室 Room 410, CSIE Building
臨床－生物醫學工程－產業融合實驗室 Merger Laboratory for Clinical Sciences, Biomedical Engineering and Industry	孫維仁 Wei-Zen Sun	臺大醫院 NTUH
計算分子設計與代謝體學實驗室 Computataional Molecular Design and Metabolomics Lab.	曾宇鳳 Y. Jane Tseng	德田館 404 室 Room 404, CSIE Building

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Chung-Ping Chen, Professor

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超大型積體電路系統晶片電腦輔助設計實驗室

SOC VLSI-EDA Lab.

自 2003 年成立至今，本實驗室一向是一個不斷追求創新及擴展知識的一個的國際化研究團隊，其研究領域包括了生醫電子，電腦輔助設計及數位 IC 設計實驗室，其研究重點在於針對電路實體設計及時序之最佳化以及線路模擬，及在針對製造時所產生之製程移之影響及解決方案。最近，我們又極力發展生醫 MRI 及 PEI 影像及血管模擬以及半導體光學製程之模擬之最佳化。在 IC 設計方面，我們主力在發展在高速低功率之微處理機所須之電路。本實驗室目前的研究方向主要可分為九大領域。

- 生醫 MRI, PET 影像處理
- 生醫行動生理檢測系統
- 蛋白質摺疊分析
- 可製造性設計
- 數位電路之最佳化
- 統計型時序分析
- 高效能電路設計
- 半導體光學製程影像之模擬與處理
- 電力線通訊系統

Established in 2003, BIO-EDA-VLSI Lab has been relentlessly pursuing new challenges and enrich knowledge in the field of EDA, VLSI circuit design, and BIO/Optical Microlithography Image Simulation and Processing. The focus of our research field include the following 9 major projects:

- Biomedical MRI,PET Imaging processing
- The transmission and analysis of Bio-signal
- Protein folding
- Digital Circuit Optimization
- Design for Manufacturabiliy
- Statistical Static Timing Analysis
- High Performance Circuit Design
- BIO and Optical Microlithography Imaging Simulation and Processing
- Power Line Communication system

主要研究領域 Major Research Areas

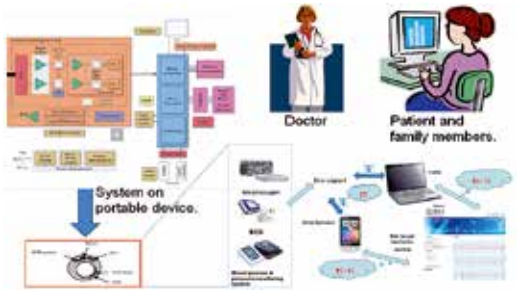
生醫及半導體光學製程影像處理、微處理機設計、VLSI 電腦輔助設計、微波通訊線路設計、電力線通訊系統、生醫行動生理檢測系統

BIO/Optical Microlithography Image Processing, VLSI CAD, Microprocessor Design, RF Mix/Signal Circuit Design, Power Line Communication system, The transmission and analysis of Bio-signal

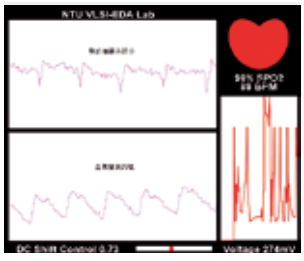
研究計畫 Research Projects

1. 次微米下之高速電路及低耗電最佳化
   Deep-Sub-Micron High-speed Low Power Optimization
2. 動態邏輯加法器設計及自動化
   Domino Adder Design and Automa
3. 次微米級干涉週期量測之診斷演算法
   Efficient and Accurate Optical Scatterometry Diagnosis of Grating Variation Based on Segmented Moment
   Matching and Singular Value Decomposition Method
4. 行動式無線癲癇症預測雲端系統
   Mobile Wireless Epilepsy Seizure Prediction System with Cloud Computation Method
5. 連續性個人化健康照護整合平台子計畫三

■ **研究計畫** -
連續性個人化健康照護整合平台子計畫三之代表圖：



■ **研究計畫** -
Telecare platform with portable biomedical system applied in Smartphone：
結合藍芽晶片傳送至智慧型手機，做圖形化的顯示。



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醫學影像實驗室

Medical Imaging Lab.

醫學影像實驗室目前位於臺灣大學明達館七樓。負責人為陳志宏 (Jyh-Horng Chen) 教授。主要研究方向為核磁共振造影 (MRI)，包含功能性大腦影像之突破、新一代 MRI 成像之研究及生醫分子影像，並藉由生物、醫學、工程的結合於醫學影像學所造就的優勢，進行「個人化醫學」之努力。

在電機一館及電機二館分別設有 MRI/MRS 實驗室，設置 Bruker 3.0 Tesla MRI，以及動物用 Bruker 7.0 Tesla MRI；於永齡生醫工程館設有 MRI 及 MEG；並在生醫分子影像研究中心底下成立生醫分子影像核心實驗室。平時提供校園內學術單位做研究，以及本實驗室研究造影技術之用。

電機一館 Bruker 3.0 Tesla MR

核磁共振影像頻譜實驗室
Magnetic Resonance Imaging Lab.

本實驗室於 1999 年成立，以提供有效、可靠的成像技術及訓練課程予各研究領域之研究學者，心理學家、生理學家、動物學家，可藉由磁振光譜影像之重建方式，為未來之基因蛋白體研究、動物病變模型之評估，提供微細且精確的訊息，以成為臺灣的 MRI 研究及人才培訓資源中心。另一方面，本實驗室亦從事新技術之研發，期能突破現有磁振造影 (MRI) 之成像速度限制，提升磁共振影幅系統成像能力及臺灣在磁共振領域之國際知名度，並藉由國內現有 MR 研究資源合作，以跨學科之研究，使人文、科學、醫學、工程等不同學科得以匯整激盪，並創造 21 世紀之新學門科學，建立一個世界級之核磁共振卓越中心。主要研究方向包括：大腦功能性磁振造影、擴散磁振造影、MR 線圈設計、MRI 成像最佳化技術、超快速平行擷取 MRI 系統、小動物生理病理研究、分子影像。

電機一館 Bruker 3.0 Tesla MR

The laboratory will apply the existing MRI / MRS techniques to interdisplinary research, including school ofhumanity, psychology, medicine, engineering, agriculture and food science. Its object is to combine experts indifferent areas to generate, hopefully, some new academic areas in 21 century. This laboratory is supported byNational Taiwan University (NTU) as well as Instrumentation Center of National Science Council (NSC) in Taiwan.

電機二館動物用 Bruker 7.0 Tesla

MRI/MEG

團隊於 2015 年爭取科技部 2 億 1 千萬「心智科學大型研究設備建置及共同使用服務計畫」，建置 MRI/MEG 儀器於台大生醫工程館，服務全國學者，研究人文社會科學領域之腦功能相關議題。並成立「身體、心靈與文化整合影像研究中心」(Imaging Center for Integrated Body, Mind and Culture Research)，以期結合人文與社會科學；自然與生命科學、工程與醫衛科學等方面之人才及知識，探討人類的大腦、心智、環境與文化彼此間如何進行雙向互動，以追求對千古謎題──「心靈與身體」關係──的進一步瞭解。

永齡生醫工程館 MEG

永齡生醫工程館西門子 3T Prisma MRI

The team won 210 million funding from the Ministry of Science and Technology in 2015 for the "Installation and Operation of Core Facility in Mind Science: An Initiative for Integrated Research on Brain, Mind and Culture" project. The funding is used in establishing MRI / MEG instrument in the NTUYongLin Biomedical Engineering Center, open to all researchers in the country, so as to facilitate research in brain function related issues among the humanities and social sciences faculties.

生醫分子影像核心實驗室

Biomedical Molecular Imaging Core Lab.

此核心實驗室位於台大生物科技館，結合磁共振 (MR) 分子影像、光學分子影像 (Optical molecular imaging) 及超音波分子影像 (Ultarsonic molecular imaging) 此外，為使活體中特定的分子成像，除了要有上述高分辨率、敏感、快速的成像技術，還具備合成具有高親和力的分子探針及具有特異標定之顯影劑。

本核心實驗室主要目標之一為提供分子醫學影像之量測與生物體之醫學成像技術研究服務予臺灣大學醫學院區內從事生物醫學、基礎醫學與臨床醫學研究人員，此外，本實驗室致力發展新型醫學影像之顯影劑開發，並結合分子生物之技術，開發新式具特異標定功能之奈米粒子。

This core combined MR molecular imaging, optical molecular imaging and ultrasonic molecular imaging, thence,besides above mentioned properties, high spatial resolution, sensitivity and fast imaging technology, it has the abilityto synthesize high affinity molecular probe and specific-targeting contrast agent, and then in vivo specific molecularimaging will be obtained.

Our primary aim for this Biomedical molecular imaging Core is to provide research services to all the investigatorswithin NTU medical campus, and conducting methodological research related to biomedical molecular imaging is oursecondary aim. On the other hand, we also develop the novel contrast agents which have specific targeting function fordisease model.

主要研究領域 Major Research Areas

核磁共振影像、醫學工程

Magnetic Resonance Imaging, Advanced Human Brain Mapping Techniques, Molecular Imaging

研究計畫 Research Projects

1. 超高靈敏度磁振造影暨高溫超導量子干涉元件之多模態動物癌症診斷平台─超高時空解析度之磁化率定量影像：多模態動物癌症診斷技術開發
2. 探索功能性磁振造影之神經生理機制：負活化血氧相依與功能性聯結
3. 預測大腦認知年齡：以多模態影像建構跨物種神經血管之老化模型
4. "自覺記憶衰退" 對認知功能無缺損的中、老年人之大腦功能性和結構性變化的影響—顳葉內側次結構之高解析度磁振造影研究
5. 以巨量而深厚的行為 / 神經造影資料開發善解人意的社會互動型人工智慧系統
6. 心智科學大型研究設備共同使用服務計畫—身體、心靈與文化整合影像研究中心
7. 國立臺灣大學貴重儀器使用中心服務計畫 (總計畫)

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成佳憲 教授

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國立臺灣大學醫學院臨床醫學研究所合聘教授
國立臺灣大學醫學院附設醫院腫瘤醫學部放射腫瘤科主治醫師
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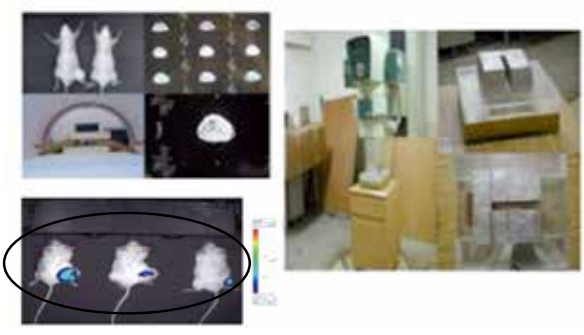
Adjunct Professor, Graduate Institute of Clinical Medicine, National Taiwan University College of Medicine
Attending Physician, Division of Radiation Oncology, Department of Oncology, National Taiwan University Hospital
Fellow of American Society for Radiation Oncology (FASTRO)

放射物理生物實驗室

Radiation Physics and Biology Lab.

本實驗室由成佳憲教授於 2002 年起隨同整建臺大醫院腫瘤醫學部放射腫瘤科時設立，主要從事放射治療物理學與放射生物學相關研究，目前以設備技術物理與腫瘤放射治療轉譯醫學等領域為研究重點。本實驗室在影像導引放射治療領域與肝癌放射治療領域已產出許多具體貢獻。本實驗室之成員來自臺大醫院腫瘤醫學部放射腫瘤科醫學物理師、放射師及放射生物醫學領域研究人員，多年來亦積極與國內外單位進行合作。

The laboratory for radiation physics and biology was established by Jason Chia-Hsien Cheng, M.D., M.S., Ph.D., with the reconstruction of Division of Radiation Oncology, Department of Oncology, National Taiwan University Hospital. The main research directions are radiation physics related to equipment and technique, as well as translational medicine of radiation oncology. Our research team has been contributing significantly the progress in image-guided radiation therapy and radiotherapy to hepatocellular carcinoma. The team members of our laboratory include the radiation physicists, radiation technologists, and radiation biologists from Division of Radiation Oncology. The laboratory also has the collaboration with the other research teams in Taiwan and in the other countries.



主要研究領域 Major Research Areas

放射腫瘤學、放射物理學、放射生物學、癌症轉譯醫學
Radiation Oncology, Radiation Physics, Radiation Biology, Cancer Translational Medicine

研究計畫 Research Projects

1. 肝癌細胞放射線增敏以第一型拓樸異構酶抑制劑為潛在治療策略
   Radiosensitizing of HCC for potential strategy by type I topoisomerase inhibition.
2. 探討抑制組蛋白去乙醯酶調控去氧核醣核酸修復蛋白質小泛素修飾於肝癌放射增敏作用機制
   Molecular mechanism of radiosensitization by HDAC inhibition mediated SUMOylation of DNA repair proteins in hepatocellular carcinoma
3. 探討拓樸異構酶 I 抑制劑經由 RNF144A 相關泛素化反應之放射線增敏機轉
   Molecular mechanism of radiosensitization by RNF144A related ubiquitination of type I topoisomerase inhibitor.
4. 巨噬細胞與組蛋白去乙醯酶共同在不同肝癌細胞放射線照射細胞的存活率與侵襲性的前導研究
   Pilot study: The survival rate and invasion of different HCC co-culture with macrophages and HDAC.

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Director, Yong Lin Biomedical Engineering Center, National Taiwan University
Deputy Director, Research and Development Center for Medical Devices, National Taiwan University
Principal Investigator, Bioinformatics and Biostatistics Core Lab, NTU Center of Genomic and Precision Medicine
Joint Appointment Research Fellow / Genomics Research Center, Academia Sinica
Deputy General Director, Biomedical Technology and Device Research Laboratories, Industrial Technology Research Institute, Hsinchu, Taiwan

生物晶片實驗室
Microarray Lab.

本研究室研究是以基因體學探討癌症形成機制為主軸。近年來基因晶片(DNA microarray)與次世代定序(Next-Generation Sequencing)已經被廣泛應用在同時觀察大量的基因表現，為研究特定基因調控極為方便、快速與可靠的方法。因此研究室的研究方向乃致力於增進基因晶片與次世代定序技術在生物醫學領域上的應用，研究範疇涵蓋晶片製備技術、影像擷取與分析、次世代定序資料分析、生物資訊學、應用工具與資料庫系統開發，以及利用基因晶片分析與次世代定序技術來解析致癌基因複雜的調控關係，探討基因表現或基因突變與細胞反應的關連。長遠的目標為藉由基因體研究找尋特定的癌症分子指標，將來作為癌症治療與診斷的標的。

The focus of our laboratory is using genomic approaches to investigate the mechanisms of carcinogenesis. DNA microarray and Next-Generation Sequencing (NGS) have been applied widely in simultaneously monitoring a large quantity of gene expression patterns and served as a convenient, quick, and reliable method to investigate specific gene regulation. Therefore, our lab devotes to the application of microarray and NGS technologies in the biomedical field. Interests in our laboratory include microarray fabrication, image capture and analysis, NGS data analysis, bioinformatics, development of application tools and database systems, and application of those techniques to identify the complicated regulatory mechanisms of cancer related genes, as well as the correlation between gene expression or gene mutation and cellular response. Our long-term goals are via genomic study to identify specific cancer molecules as biomarkers for the targets of cancer therapy and diagnosis.

主要研究領域 Major Research Areas

生物晶片、次世代定序、生物資訊、癌症生物、輻射生物、精準醫學
Biochip, Next-Generation Sequencing, Bioinformatics, Cancer Biology, Radiation Biology, Precision Medicine

研究計畫 Research Projects

1. 基因定序研究計畫 (極諾生技股份有限公司)
2. 質子治療技術提升計畫 (錫安生技股份有限公司)
3. 利用體學方法進行六輕附近居民暴露空氣污染物之風險評估 (財團法人國家衛生研究院)
   Risk assessment of pollutants by omics approaches in people living near No. 6 Naphtha Cracking Plant
4. 台大 – 台體共創榮耀：跨領域整合精準提升棒球技戰術水準與國際競賽成績 (技戰術分析)(科技部)
   Cooperation between NTU and NTUS: Integrated precision approach to improve baseball skills, tactics and competition performance
5. 食道癌合併多重癌症特徵及多面向生物標誌之探討 -- 利用總體基因組定序分析菌相探討食道癌合併多重癌症的菌相特徵與有潛力的生物標記 (科技部)
   Metagenomic sequencing analysis to identify potential biomarkers in synchronous multiple primary cancers with esophageal squamous cell carcinoma
6. 探討 Semaphorin 6A 引發之免疫效果及其在肺癌免疫療法上之應用 (科技部)
   Characterization of SEMA6A-derived immunity and its potential applications of immunotherapy in lung caner, project period
7. 再生醫學科技發展計畫 – 幹細胞組織工程於氣管再生醫學之應用 (科技部)
   Application of stem cell and tissue engineering in regenerative medicine of the trachea
8. 精準醫學研究中心 (科技部)

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黃念祖 副教授

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光流體生醫系統實驗室

Bio-Optofluidic Systems Lab.

光流體生醫系統實驗室為黃念祖博士成立於 2013 年，隸屬於國立台灣大學電機工程學系和生醫電子與資訊學研究所。本實驗室主要研究為發展整合型微流體生物晶片 (Lab-on-Chip)，其晶片將微型化電子、光學、機械及流體等元件進行生醫領域相關應用，如細胞生物學、藥物篩選、快速疾病檢測，並期許將來能使用醫療資源較為匱乏環境之定點照護功能 (Point-of-care)。

Bio-Optofluidic System Lab is in the department of Electrical Engineering and the graduate institute of Biomedical Electronic and Bioinformatics at National Taiwan University, Taipei, Taiwan. Our lab is focusing on developing integrated electrical, optical and mechanical miniaturized fluidics and sensors for biological applications, such as cellular biology, drug screening, and disease diagnosis.

主要研究領域 Major Research Areas

生醫微機電、光微流道系統、微系統細胞操控、生醫感測、奈微米製造技術
Bio-MEMS, Optical-MEMS, Microfluidics, Bio-sensing, Cell Manipulation in Microenvironment, Micro/Nano Fabrication Techniques.

研究計畫 Research Projects

1. 「表面增強拉曼散射－抗生素敏感性檢測」整合微流道系統之應用研究 "Antibiotic Susceptibility Test based on Surface-enhanced Raman Spectroscopy" integrating the microfluidic system", sponsored by 國立臺灣大學與臺大醫院 UN109-061, N.T.$ 585,000, 2020/01/01-2020/12/31.

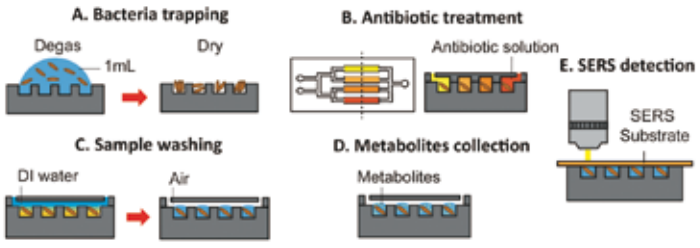

Fig. 1 The operational protocol of using microfluidic platform integrated SERS-AST

2. 整合微流道及電子感測晶片之定點照護式敗血症檢測系統＂ Integration of microfluidics with electrical sensors for point-of care-based sepsis diagnosis＂, sponsored by 科技部 109-2221-E-002 -044 -, N.T.$ 1,272,000, 2020/08/01-2021/07/31.

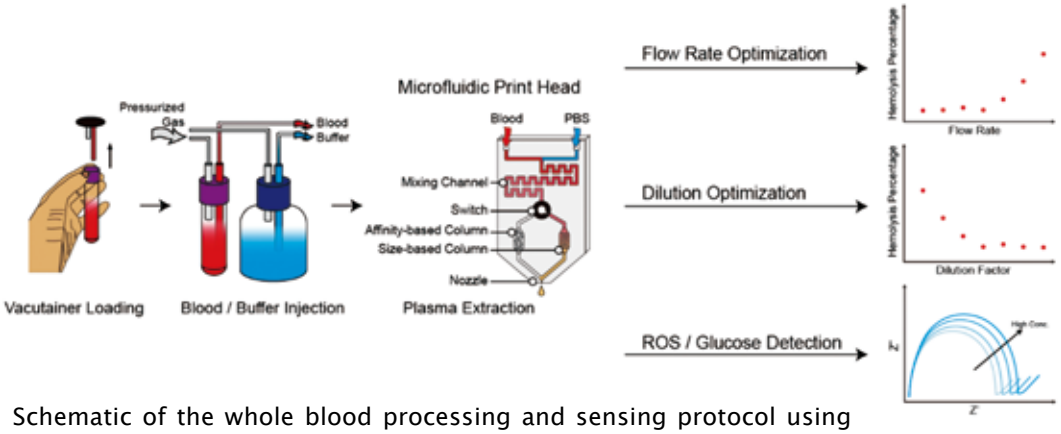

Fig. 2 Schematic of the whole blood processing and sensing protocol using the microfluidic size and affinity-based column

3. 開發可進行快速全血處理及生化分子感測之多功能微流道系統
Developing a multi-functional microfluidic platform for rapid whole blood processing and simultaneous detection of multiple biomarkers', sponsored by 國立臺灣大學高教深耕計畫, N.T.$ 2,680,000, 2018/06/01-2020/12/31.

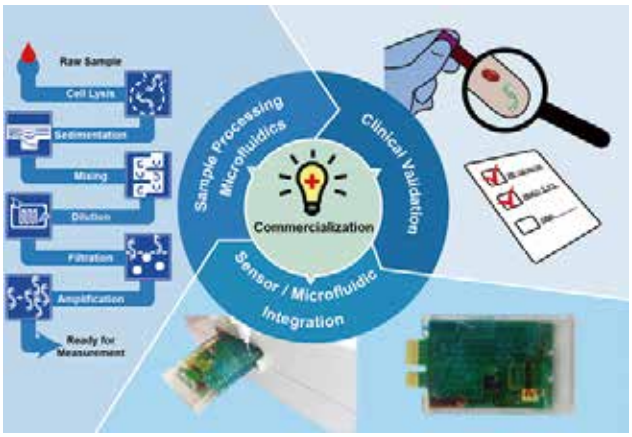

Fig. 3 Schematic of the project scope, including three major parts: whole blood processing modules, sensor/microfluidics integration and clinical validation

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Hsiao-Wen Chung, Distinguished Professor

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國立臺灣大學電機工程學系教授

Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Department of Electrical Engineering, National Taiwan University

醫用磁振造影研究室

Magnetic Resonance in Medicine Lab.

成立於 2000 年 7 月，指導教授為鍾孝文教授，目前計有博士班研究生 9 名，博士後研究員一名。博士班畢業生 29 名，碩士班畢業生 22 名。

Founded in July 2000. Supervisor: Prof. Hsiao-Wen Chung. This lab currently has 9 Ph.D. students and 1 post-doctoral research fellow, plus 29 Ph.D. graduates and 22 M.S. graduates.

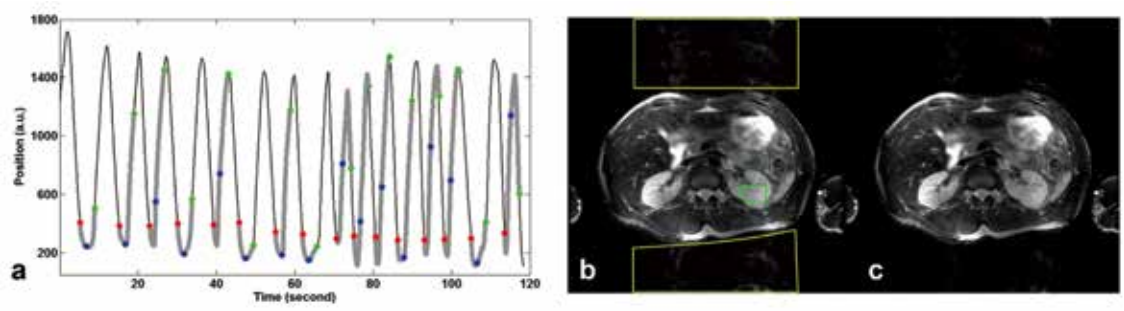
主要研究領域 Major Research Areas

醫用磁振造影
Biomedical magnetic resonance imaging

研究計畫 Research Projects

1. 自由呼吸式腹部主動脈動態磁振造影：使用加速式黑血快速自旋迴訊
   Free breathing black-blood cine MRI of the abdominal aorta using accelerated fast spin-echo
   補助單位：行政院科技部工程司
   計畫期間：2016/8/1 ~ 2019/7/31
2. 以進階加速技術進行定量磁共振弛緩圖譜
   Quantitative magnetic resonance relaxation mapping with advanced acceleration techniques
   補助單位：行政院科技部工程司
   計畫期間：2018/8/1 ~ 2021/7/31

■ 代表圖及中英文說明：
使用快速自旋迴訊的自動呼吸校正技術：(a) 為呼吸狀態下之腹腔起伏位置，彩色點為不同切面的觸發點。(b) 與 (c) 為其中一張影像切面使用二維傅立葉轉換與實驗群所提之疊代演算法重建結果比較。
Experimental results of respiratory-triggered abdominal fast spin-echo imaging: (a) shows the respiratory waveforms, with red, blue and green dots representing trigger points of three different slices. (b) and (c) are representative images of one slice reconstructed with 2D Fourier transform and an iterative method developed in our laboratory, respectively.



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Chieh-Hsiung Kuan, Professor

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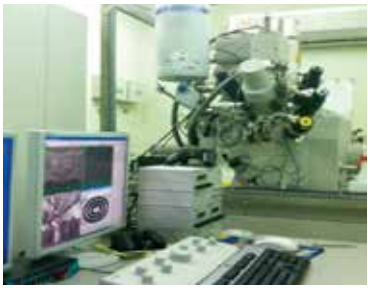
Professor, Graduate Institute of Biomedical Electronics and Bioinformatics/ Graduate Institute of Electronics Engineering/ Department of Electrical Engineering, National Taiwan University

電子束暨奈米元件實驗室
E-beam and Nano Device Lab.

- 電子束微影製程與電子束顯微鏡實驗室
  (Direct-Writing Electron Beam Lithography System Lab., Scanning Electron Microscope Lab.)
- 聚焦離子束實驗室 (Focus Ion Beam Lab.)
- 微拉曼 / 光激發光光譜實驗室 (Micro-Raman/PL Spectral Lab.)
- 紅外線光譜實驗室 (Infrared Spectral Lab.)

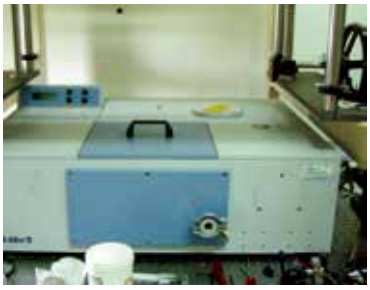


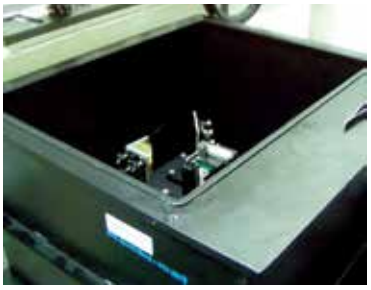
Focus Ion Beam -FIB,聚焦離子束設備

電子束微影系統(100KeV高加速電壓)

電子束微影系統(50KeV中加速電壓)

電子束顯微鏡與微影系統
(5KeV低加速電壓)

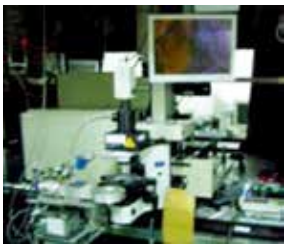




Bruker FTIR 紅外線光譜儀及變角度反射模組

電晶體特性曲線實驗器

FTIR 紅外線光譜儀



T 64000微光譜量測系統
(含XY平面定位掃描功能)

電子束顯微鏡系統
(5KeV低加速電壓)

主要研究領域 Major Research Areas

紅外線光偵測器、發光二極體、太陽能電池、電子束微影技術、生醫元件、心電圖特性分析、量子點元件、電子元件雜訊分析、光學模擬、聚焦離子束系統、超穎表面結構

Optoelectronic Device, E-beam Lithography, Noise Measurement, Bio-medical Chip, ECG Analysis, Quantum-dot Device, Optics simulation, Focused-ion-beam System, Metasurface Structure

研究計畫 Research Projects

1. 發展電子束微影技術與聚焦離子束技術於製作三維微結構
   Development of eBeam Lithography technology and Focused-ion Beam technology for Three-dimensional Nano- fabrication
2. 共振式太陽能電池 Resonant Solar Cell
3. 發展奈米結構增強光偵測與光發射
   Development of nano-tructures to enhance light detection and emission
4. 矽鍺量子點奈米級記憶元件及陣列之製作與研究
   Nano-scale SiGe quantum-dot memory and array
5. 可低偏高溫操作且正向頂面入射的超晶格紅外線偵測器及陣列的研發
   Development of the Superlattice Infrared Photodetector and Array for Low-Bias High-Temperature Operation and Top Normal Incidence of Light
6. 光譜與電性量測於基因篩選之應用
   Application of spectrum and electrical signal measurements on gene screening
7. 窄頻紅外線光源與偵測器及其在植物與神經細胞上的應用
8. 離子的高敏感度交流電性量測並以紅外線頻譜作輔助分析 (2/3)
   High-sensitivity AC electrical signal measurement and infrared spectrum assistant analysis originated from ions
9. 整合雙能障超晶格及量子井紅外線偵測器以達到高偵測率高響應及高溫操作
   Integration of double-barrier superlattice and quantum well infrared photodetectors for advantages of high detectivity, high responsivity, and high-temperature operation
10. 平面型寬頻消色差超穎透鏡
    Broadband achromatic optical metasurface devices

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Associate Professor, Graduate Institute of Biomedical Electronics and Bioinformatic/ Department of Electrical Engineering, College of Medicine, National Taiwan University
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細胞行為實驗室

Cell Behavior Lab.

本實驗室主要研究細胞物理學、力學生物學的基礎原理以及相關臨床運用。力學生物學為一新興的跨領域學科，主要探討與力學訊息相關的生物反應。力學訊息目前被認為與多種生理及病理過程有強烈相關，包括組織生成、傷口癒合、血管新生、動脈硬化、心肌肥大、以及腫瘤進展等。因為相對僅能靠擴散方式作用的化學物質而言，力學訊號的作用範圍更遠，傳遞速度也較快。因此在大範圍組織整合過程，包括組織發育、修補、以及退化，惡化，光學訊號可能扮演了具有相當決定性的角色。我們特別對壓力對生物體的影響、生物體如何利用力學訊息通訊、並互相調節功能、以及改造周遭力學環境有興趣。我們研究重點是同質細胞間的自我聚合及功能整合，以及異質細胞間的空間協調。我們的短期目標是發展出能精確測量、並調控細胞與細胞間、以及與介質間力學通訊的實驗平台。遠程目標則是促進吾人對異質細胞間在各種生理、病理狀態下的交互作用，並對組織老化及再生的治療方針上有所啟益。目前本實驗室的研究主題為

- 力學在細胞生理學以及生物物理學的角色
- 利用生物微機電技術製作可供研究細胞間通訊、以及多重物理因子對細胞生理影響肢體外實驗平台
- 建立可監控細胞與環境力學互動之三維體外實驗平台，並探討該平台在臨床上如藥物篩檢等應用
- 結合人工智慧、醫學影像分析與高能超音波，建立臨床上可用於監測及治療緻密結締組織，如肌腱及韌帶，力學功能失常時之非侵入性工具及技術

Mechanobiology is a new field focusing on understanding how living organisms generate, sense, and respond to various mechanical stimuli, which are believed to play a key role in numerous physiological and pathological processes, such as tissue development, tissue repairing, atherosclerosis, cardiac hypertrophy, and cancer progression. My researches primarily focus on the fundamental mechanisms and clinical applications of mechanobiology. Specifically, we investigate the effects of hydrostatic pressure and environmental elasticity on cell physiology, how cells remodel the mechanical properties of their environment, and develop tools quantitatively evaluate the mechanics of cell-matrix interactions. Our previous achievements and ongoing projects include

1. Elucidate the role of hydrostatic pressure on cell physiology
   Hydrostatic pressure is an important physical factor in tissue physiology and pathology. We investigated how hydrostatic pressure affects muscle differentiation, immunological activities, cell motility, and cancer invasiveness. Currently we are working on the possible biological signaling pathways involving these processes.
2. Evaluate the effects of multiple biophysical and biochemical stimuli on cell physiology
   The cells in vivo are generally exposed to the coexistence of multiple biophysical and biochemical cues. Knowledge of how cells response to these complex stimuli is important for many disciplines such as regenerative engineering and cancer biology. Using BioMEMS techniques, we have developed several platforms allowing the coexistence of mechanical, electrical, and chemical stimuli for cultured cells. Currently we are delineating the antagonistic and agonistic roles between these stimuli.
3. Develop a 3D cell culture system that allows quantitatively accessing the mechanics of cell-matrix interactions
   The changes of mechanical properties such as stiffness of a tissue usually are hallmarks of various physiological and pathological processes, such as arthrosclerosis and tumor malignant transformation. In vitro assays quantitatively measuring the mechanics of cell-matrix interactions are of great importance to understand the mechanisms and facilitate the development of corresponding therapeutic strategies of these processes. Cells cultured in a 3D environment behave far different from that cultured in 2D and recapitulate more physiological characteristics in vivo. An important ongoing project in our lab is to develop a 3D cell culture system using state-of-the-art imaging and scaffold fabrication techniques to quantitatively access the mechanics of live cell-matrix interactions.
4. Develop clinical tools for treatment and monitoring of the mechanical dysfunction of dense connective tissues
   Mechanical malfunction of dense fibrous tissues usually leads to protracted and debilitating conditions, such as joint capsule contracture, tissue fibrosis, and tendinosis. Our goal is to develop clinical tools that allow treating these disorders non-invasively, while the change of mechanical function of the diseased tissues can be non-invasively and quantitatively monitored. We have combined the state-of-the-art ultrasonic techniques and developed a prototypical system for this purpose. Our ongoing project is to evaluate its effectiveness in various clinical conditions.

主要研究領域 Major Research Areas

生物物理、力學生物學、生物力學、組織工程、醫用超音波
Biophysics, Mechanobiology, Biomechanics, Tissue engineering, Medical ultrasound

研究計畫 Research Projects

1. 靜水壓力對肌母細胞型態及分化影響
2. 智慧型非侵入陣列式血流監控系統晶片 -- 子計畫六：以非侵入陣列式系統晶片監控頸動脈血流動力—力學模型及臨床評估
3. 經濟部政策型科專計畫：診斷超音波系統關鍵技術開發 3 年計畫—影像核心平台基礎技術開發
4. 用於肌腱治療之超音波剪力影像
5. 萌芽個案計畫 – 三維細胞培養系統與影像觀測技術
6. 三維折射率活細胞顯微術
7. 適用多波影像之三維細胞培養支架開發
8. 物理性刺激對細胞運動影響的定量研究
9. 肝硬化動物模式替代方案 – 小鼠肝臟星狀細胞之多孔道微流培養系統
10. 使用剪力波彈性影像之三維體外肺癌力學生物學研究系統之開發
11. 萌芽個案計畫 – 用於三維細胞培養系統之剪力波彈性量測設備之設計驗證、樣機製作與應用推廣
12. 剪力波斷層掃描影像儀：技術創新與治療應用 (重點主題 :C3) - 子計畫二：組織纖維化—組織間質流體壓力與組織彈性之體外模型
13. 細胞間通訊在外部物理刺激下的調控研究
14. 再生醫學科技發展計畫 -- 全身安全性異體移植策略之細胞治療產品開發：標靶醫療未滿足慢性發炎相關疾病 – 糖尿病 / 褥瘡 / 嚴重燒燙傷之傷口癒合與多發性硬化症
15. 台大 – 台體共創榮耀：跨領域整合精準提升棒球技戰術水準與國際競賽成績 (技戰術分析)-- 台大 – 台體共創榮耀：跨領域整合精準提升棒球技戰術水準與國際競賽成績 (技戰術分析)
16. 纏套性神經病變：動態超音波智慧影像分析架構
17. 動態超音波正中神經纏套智慧輔助診斷系統

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Distinguished Professor, Graduate Institute of Biomedical Electronics and Bioinformatics/ Department of Electrical Engineering/ Graduate Institute of Communication Engineering,National Taiwan University

統計信號處理實驗室
Statistical Signal Processing Lab.

本實驗室由李枝宏教授負責成立於 1986 年，主要研究領域為數位信號處理之理論與技術研發，近年來也積極進行應用數位信號處理之理論與技術於生醫領域之相關研究，包含：

1. 由國立臺灣大學醫學院骨科部提供人體膝關節病變與運動傷害所產生之振動訊號，應用相關信號處理理論研發建立此振動訊號之數學模型的技術，以協助臨床上分析診斷人體膝關節病變與運動傷害之型態與種類，以期提供醫生進行正確且必要醫療措施所需之資訊。
2. 由國立臺灣大學獸醫學系提供馬匹膝關節病變與老化所產生之振動訊號，應用相關信號處理理論研發建立此振動訊號之數學模型的技術，以協助臨床上分析診斷馬匹膝關節病變與老化之型態與種類，以期提供獸醫生進行正確且必要醫療措施所需之資訊。
3. 由國立臺灣大學醫學院牙科部提供人體顳顎關節病變所產生之振動訊號，應用相關信號處理理論研發建立此振動訊號之數學模型的技術，以協助臨床上分析診斷人體顳顎關節病變之型態與種類，以期提供醫生進行正確且必要醫療措施所需之資訊。目前進行的研究希望利用此特性進而更精確的找出膝關節振動訊號的特徵，進而發展實用簡單方便的非侵襲性關節診斷系統。

I. Basic Digital Signal Processing:
   (1) Techniques for the Design and Implementation of 1-D and 2-D FIR and IIR Digital Filters.
   (2) Techniques for Design and Implementation of 1-D and 2-D FIR and IIR Digital Filter Banks (Multi-rate Digital Signal Processing)

II. Statistical Digital Signal Processing:
   (1) Adaptive Signal Processing for Array Signals
   (2) Adaptive Array Beamforming Under Random Mismatches
   (3) Adaptive Array Bearing Estimation Under Random Mismatches
   (4) Adaptive Beamforming Using 2-D Circular Array for Wireless CDMA Systems
   (5) Adaptive Minimum Bit Error Rate Beamforming Assisted Receiver for Wireless Communications
   (6) Adaptive Signal Processing Techniques for Smart Antennas with Applications in Wireless and Mobile Communications

III. Processing and Analysis of Biomedical Signals:

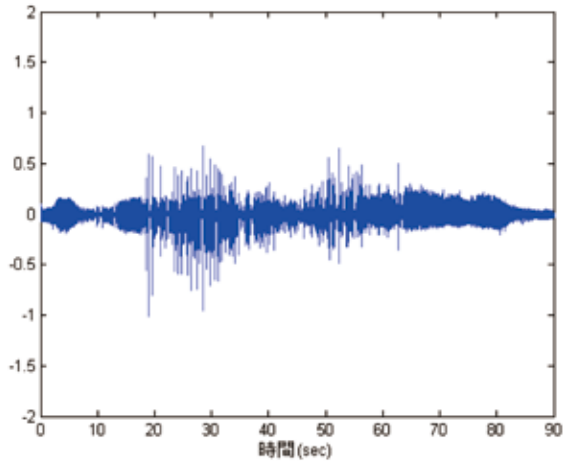
Analysis and Processing of Joint Vibration Signals for the Diagnosis of Cartilage Pathology

(1) Signal Processing Techniques for Vibration Signals of Human Knee Joints

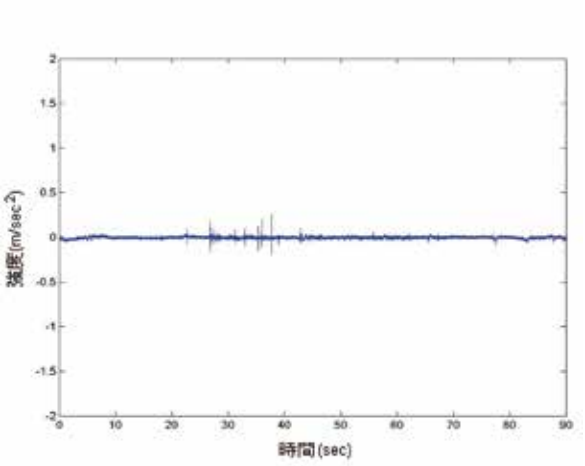
(2) Signal Processing Techniques for Vibration Signals of Equine Knee Joints

(3) Signal Processing Techniques for Vibration Signals of Human emporomandibular joints

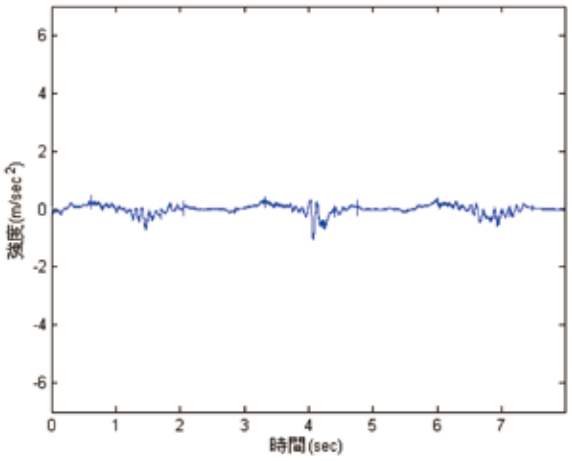
Goal of this research: To conduct research on Vibration Arthrometry (VAM) and provide the public a noninvasive, accurate tool (Expert Systems) for the diagnosis of joint disorders in clinical medicine.



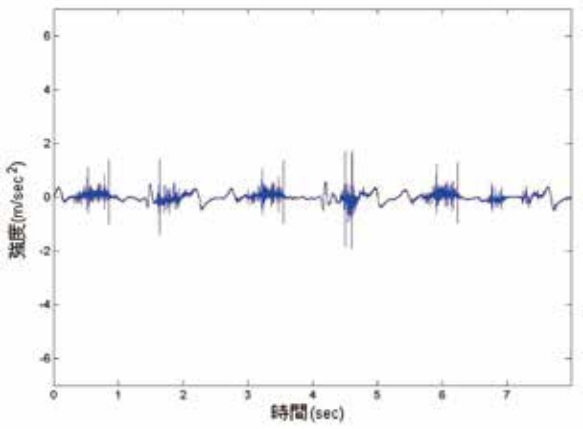
(A) 正常著膝關節在慢速擺動下所產生的振動訊號
(Physiological Patellofemoral Crepitus; PPC)



(B) 非正常著膝關節在慢速擺動下所產生的振動訊號
(Physiological Patellofemoral Crepitus; PPC)



(C) 正常著膝關節在快速擺動下所產生的振動訊號
(Vibration Arthrometry; VAM)



(D) 非正常著膝關節在快速擺動下所產生的振動訊號
(Vibration Arthrometry; VAM)

主要研究領域 Major Research Areas

數位信號處理、智慧型天線與無線通訊信號處理、生醫信號處理、數位影像處理
Digital Signal Processing, Signal Processing for Smart Antennas and Wireless Communications, Biomedical Signal Processing, Digital Image Processing

研究計畫 Research Projects

1. 應用於視訊信號處理之二維副頻帶濾波器組之設計 (Design of Two-Dimensional Subband Filter Banks with Applications to Video Signal Processing), 行政院國家科學委員會 , NSC 97-2221-E-002-116-MY3, NT$650000.00, 2008/8 ~ 2011/7.
2. 應用於通訊環境下可適性陣列信號處理理論與技術之研究 (Theory and Techniques for Adaptive Array Signal Processing Under Communication Environments), 行政院國家科學委員會 , NSC 97-2221-E-002-174-MY3, NT$890000.00, 2008/8 ~ 2011/7.

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李百祺 特聘教授

Pai-Chi Li, Distinguished Professor

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國立臺灣大學生醫電子與資訊學研究所特聘教授
國立臺灣大學電機工程學系特聘教授
國家衛生研究院醫工組兼任研究員

Vice President , Office of Research and Development, National Taiwan University
Distinguished Professor, Department of Electrical Engineering and Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Adjunct PI, National Health Research Institutes

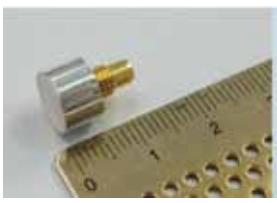
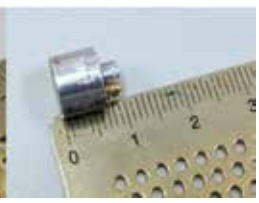
超音波影像實驗室

Ultrasonic Imaging Lab.

本實驗室由李百祺教授成立於 1997 年，主要從事醫學電子與影像物理相關研究，目前以生醫超音波技術與光聲影像等領域為研究重點。本實驗室在上述領域已產出許多具體貢獻並在全世界有很高之能見度。此外，本實驗室之成員來自電子、資訊、工程、生命科學及醫學等各領域，多年來亦積極與國內外單位進行合作，合作夥伴包括產、研、學各界，領域更涵蓋基礎科學、工程技術與臨床研究。跨界整合研究資源，致力前瞻生醫科技研究，提升健康與醫療品質，是本實驗室之成立宗旨與具體目標。

Ultrasonic Imaging Laboratory was founded by Professor Pai-Chi Li in 1997, with the main research focus in biomedical electronics and imaging physics. In the past few years, we have conducted a number of research projects in biomedical ultrasound and photoacoustic imaging. We have also made several critical contributions and are now one of the most visible research laboratories in this field in the world. Members of the lab come from various backgrounds, including electronics, informatics, engineering, life sciences and medicine. We have also been actively collaborating with research labs throughout the world, covering industry, research institutes and universities, from basic sciences, engineering to clinical research. Integrating multi-disciplinary research efforts, exploring advanced biomedical technologies, and improving healthcare quality is the mission of this lab.



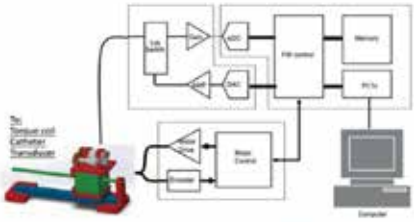





主要研究領域 Major Research Areas

生物醫學工程、超音波影像、生醫光聲影像
Biomedical Engineering, Ultrasound Imaging, Biomedical Photoacoustics

研究計畫 Research Projects

1. 創新介入性心臟血管設備開發
   Development of innovative devices for interventional cardiology
2. 使用漏溢聲波之超音波介入引導
   Ultrasound Guided Interventions Using Leaky Acoustic Waves
3. 發展微流道三維細胞培養系統以進行運用金奈米液滴之光熱治療研究
   Microfluidic 3D cell culture systems for studying photothermal therapy using gold nanodroplets
4. 利用聲孔效應調控生物物理訊息 – 腫瘤微環境硬度與癌細胞放射治療之研究
   The Role of Tumor Microenvironment Stiffness in Radiotherapy–Modulating the Biophysical Cue through Sonoporation
5. 高教深耕計畫特色領域研究中心—電子科技整合研究中心子計畫二【阻塞性睡眠呼吸中止症之影像與分子診斷】

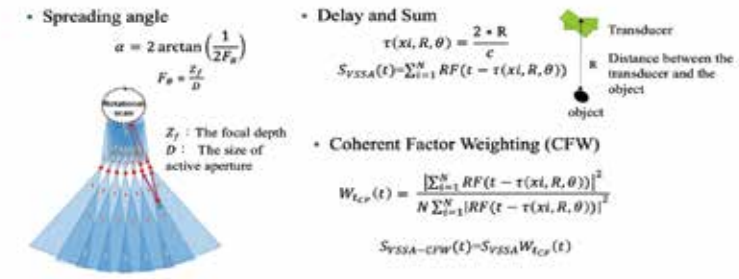


IVUS 系統架構圖

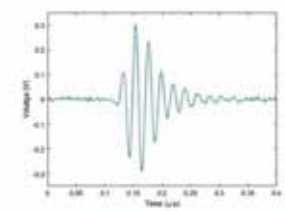
旋轉機台與探頭組裝

■ 研究計畫

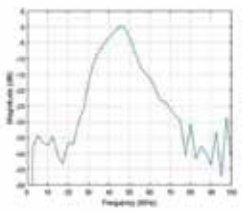
創新介入性心臟血管設備開發 Development of innovative devices for interventional cardiology 之代表圖及說明：



Virtual source synthetic aperture 方法說明



IVUS 探頭原型 pulse echo 量測結果



IVUS 探頭原型之量測頻譜

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Hsinyu Le Distinguished Professor

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國立臺灣大學電機工程學系 特聘教授
國立臺灣大學生命科學系 特聘教授

Distinguished Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Distinguished Professor, Department of Electrical Engineering, National Taiwan University
Distinguished Professor, Department of Life Science, National Taiwan University

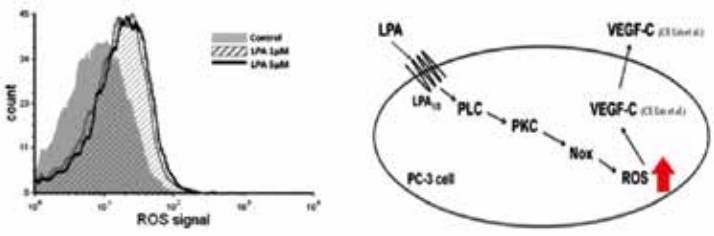
內皮細胞分子生物學實驗室

Laboratory of Endothelial Cell Molecular Biology

Research on Lysophospholipids

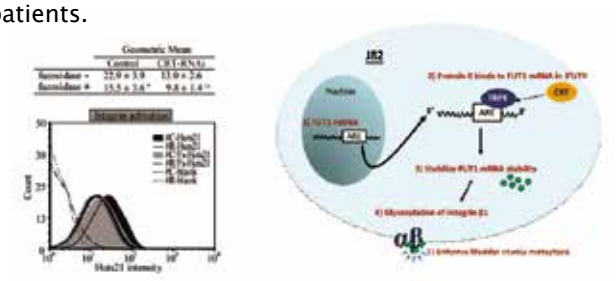
Lysophosphatidic acid (LPA) and sphingosine 1-phosphate (S1P) are two low molecular weight lysophospholipids (LPLs) highly enriched in serum. They are derived from enzymatic cleavage of membrane phospholipids. Through the efforts of my laboratory, we have demonstrated that LPLs enhance endothelial cell proliferation, migration and secretion of proteases. These observations strongly suggested that LPLs are regulators for vessel formation. In addition, LPLs also enhance ICAM-1 expression, CD31 phosphorylation and IL-8, MCP-1 secretion from endothelial cells through activating specific G-protein coupled receptors. These results suggested that LPLs are important regulators for inflammation processes. Our most recent findings suggested that LPA is also an important regulator for lymphatic vessel development. These results strongly suggested that LPA might be an important regulator for cancer metastasis. LPLs are also demonstrated by our laboratory to be important regulators for tumor development and cancer cell survival. Therefore, we expanded our research to LPL biology in different cancer models.

■ **右圖說明：**
Lysophosphatidic acid induces reactive oxygen species generation by activating protein kinase C in PC-3 human prostate cancer cells
Biochem Biophys Res Commun. 2014. 440(4):564-9



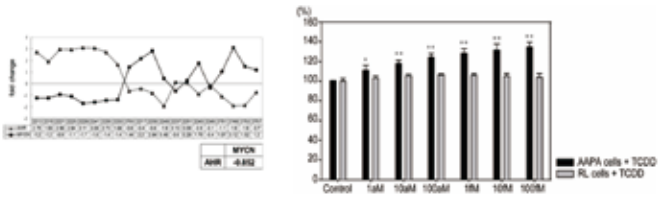
Research on Cancer cell biology

Through collaboration with colleagues at NTU hospital, we extended our research to identify neuroblastoma and hepatoma related cancer markers and exploring their potential roles in tumor formation. Calreticulin (CRT) was therefore identified as an important target. Based on these observations, we further explore the roles of CRT in bladder tumor development. Our results demonstrated that alteration of CRT levels affected cell adhesion and metastasis in bladder cancer. Furthermore, we observed that CRT regulated cell adhesion through modifying α1,2-linkaged glycan on β1-integrin, which was catalyzed by fucosyltransferase 1 (FUT1). Most importantly, we made a novel finding that higher levels of fucosylation catalyzed by FUT-1 directly activate β1-integrin. Moreover, mechanistic investigation demonstrated that CRT affected FUT1 levels through regulating mRNA stability. Our results may provide a potential clinical treatment strategy for bladder cancer patients.



■ 右圖說明：

Calreticulin activates β1 integrin via fucosylation by fucosyltransferase 1 in J82 human bladder cancer cells
Biochem J. 2014 May 15;460(1):69-78

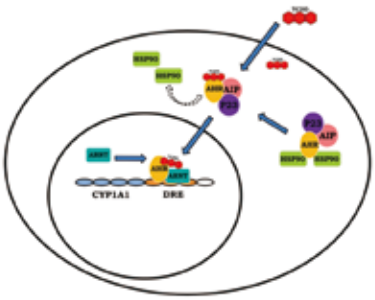


■ 右圖說明：

Aryl Hydrocarbon Receptor Down-regulates MYCN Expression and Promotes Cell Differentiation of Neuroblastoma PLoS One. 2014 Feb 21;9(2):e88795.

Dioxin detection systems and bioassay development

In the past ten years, our laboratory has intensively exploring the possibility of developing more sensitive and low cost bioassay for dioxin like compounds. Two assays, including FRET and BRET based dioxin detection systems were developed.



■ 上圖說明：

Establishment of a cell-free bioassay for detecting dioxin-like compounds
Toxicol Mech Methods. 2013 Jul;23(6):464-70

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林致廷 教授

Chih-Ting Lin, Professor

國立臺灣大學國際事務處 副國際長
國立臺灣大學生醫電子與資訊學研究所 教授
國立臺灣大學電機工程學系 教授
國家臺灣大學電子工程學研究所 教授
Assistant Vice President for International Affairs
Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Professor, Department of Electrical Engineering, National Taiwan University
Professor, Graduate Institute of Electronics Engineering, National Taiwan University

生醫晶片技術實驗室

CMOS Biotechnology Lab.

本實驗室主要研究方向為電子生醫晶片技術相關研究，目前以生物分子檢測技術、微細胞監測晶片技術、軟性電子材料與無線感測器網路系統等領域為研究重點。進一步的說明，整合現今蓬勃發展的奈微米製程科技與傳統生物科學知識，可以發展出極具應用及發展潛力之關鍵性跨領域技術，因此，本實驗室致力於開發不同之生醫電子應用晶片與系統，期能在相關領域獲得良好之成果與能見度。本實驗室之成員來自電機系、機械系及醫工等工程相關領域，以此為基礎，積極與生醫相關領域學者進行合作，相關合作領域及研究範疇涵蓋基礎科學、工程技術與臨床研究等。

A series of bio-chemical molecular sensors can be developed by utilizing nano-scale electrical devices. Based on the superior fabrication facilities and skills in Complementary Metal-Oxide-Semiconductor (CMOS) and Nano/Micro Electro-Mechanical System (N/MEMS), moreover, micro protein sensor arrays technologies and living cell monitoring systems are also envisioned to be an exciting research direction. In summary, our research is aiming at developing innovative and integrated systems for nano/bio research fields.

主要研究領域 Major Research Areas

奈微米生物機電系統、生物晶片、生物分子量測技術、奈米製程技術、生物微感測器、軟性噴墨電子技術
Bio-NEMS, Bio-Chip, Nano fabrication, Biomolecular Detection Technology, Inkjet Printing Organic Electronics

研究計畫 Research Projects

1. 噴墨式高介電質有機材料之開發及應用元件之研發 (MOST 104-2628-E-002-014-MY3)
2. 低維度奈米結構於固液界面之表面位能檢測技術之研發與應用 (MOST 105-2221-E-002-232-MY3)
3. 新世代光驅動電池及其應用感測模組與無線感測網路 (5/5) (MOST 107-2119-M-002-003)
4. 隨身式微循環刺激技術之研發 (108-2221-E-002-162)

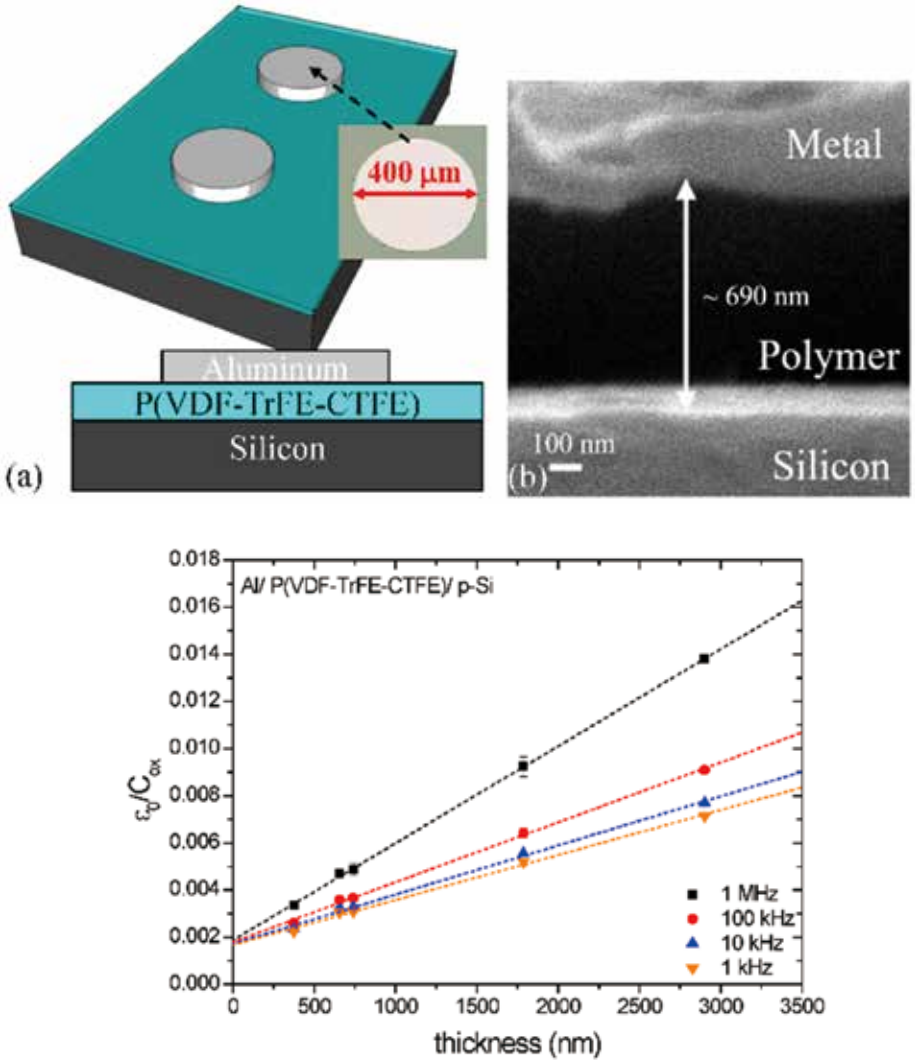
■ **研究計畫：** 噴墨式高介電質有機材料之開發及應用元件之研發
補助單位：行政院科技部
計畫期間：2015/08/01 - 2018/07/31

介電質材料 (dielectric material) 由於可以用於控制或儲存電荷與能量，並且也是電子產品或電力系統中關鍵的材料，如場效電子元件特性除了與基本半導體材料有關之外，最重要的即為介電質材料，亦即一個理想的場效電晶體需要擁有高的電流調變能力 (on/off ratio) 與較佳的次臨限擺幅，可利用高介電常數可以提升有機薄膜電晶體之電流調變能力及次臨限擺幅。因此，利用 P(VDF-TrFE-CTFE) 做為閘極絕緣材料用以改善閘極對於汲極電流的調變能力對於未來有機薄膜電晶體的發展是一個可行方向。本研究計畫目的在整合自製自動化有機材料噴墨系統、電子電路系統設計與奈微米有機材料元件的製作能力，以可噴印式高介電質有機材料研發為基礎，利用整合性自動化有機噴墨系統於可撓式基板上發展具低成本及高性能之有機薄膜元件，用以因應未來可撓性有機電子產業的需求與應用。

Project title: The development of inkjet printable devices based on P(VDF-TrFECTFE)
Supported by: Ministry of Science and Technology
Project period: 2015/08/01 - 2018/07/31

Dielectric material is one of the most important materials in electronics because it can be used to control and storage charges and electrical potential. This project aims to develop an inkjet-printable high-k dielectric material, P(VDF-TrFE-CTFE), for different kinds of organic field-effect devices, such as transistor and memory. To achieve this goal, this project integrates a self-construct inkjet-printing system, micro/nano fabrication technologies, and semiconductor device designs to implement a series of inkjet-printing, low-cost, and high-performance organic thin film devices on flexible substrates for future applications in flexible organic electronics. Within three years, this project aims to achieve 1. Inkjet-printable high-k dielectrics for organic thin film devices; 2. An inkjet-printing flexible non-volatile memory device based on the developed high-k dielectrics; 3. An inkjet-printing logic circuit implemented with a flexible substrate; 4. Implement a flexible-integrated circuit based on the developed inkjet-printing materials and technologies.

代表圖及中英文說明：



左圖為 PVDF-TrFE-CTFE 有機高介電材料電子顯微鏡照片；右圖為介電特性對材料厚度與頻率的作圖。

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Chii-Wann Lin, Professor

國立臺灣大學生醫電子與資訊學研究所 教授
國立臺灣大學醫學工程學系 教授
國立臺灣大學電機工程學系 教授

Professor, Graduate Institute of Biomedical Electronics and Bioinformatics
Department of Biomedical Engineering
Department of Electrical Engineering, National Taiwan University

醫用微感測器暨系統實驗室
Medical Micro Sensor and System Lab.

本實驗室致力於配合醫療儀器認證與驗證法規之推動與精神體現，以微機電技術與光學感測方式進行生醫奈微米微感測器元件與系統整合之研究與應用－包括表面電漿共振 (surface plasmon resonance) 原理，表面電漿子感測器設計、微型系統整合、軟硬體介面溝通，主旨在於發展快速、便利、正確、與人性化醫用感測儀器，以促進個人化醫學 (personalized medicine) 與電子化醫療 (e-health) 之研究與產業發展。

We have devoted to apply microfabrication technologies and optical sensing mechanisms to develop nano/micro sensors and integrated system for the medical applications with compliance of medical device regulations and standards. Our research currently focus on the theoretical development for novel Surface Plasmon Resonance (SPR) devices, design of SPR nano/micro sensor, bioplamonics, and the heterogeneous integration of micro-system from hardware to software. The aim is to develop the fast diagnosis, easy to use, and user-friendly medical devices toward the success of personalized medicine and e-health.

主要研究領域 Major Research Areas

生物微感測器與系統、生醫晶片、生醫光電、類神經網路、醫材法規
Bioelectronics, Biomedical Micro sensors and System, Biochip, Biomedical Optics, Artificial Neural Networks, Regulatory Affairs

研究計畫 Research Projects (103學年度：1030801-1050731)

1. 雙電漿漸逝波光學精密定量癌症轉移胞外體 (109-2221-E-002-189-MY3) 科技部
   2020/08/01~2023/07/31 (執行中 / 主持人)
2. 研發基於奈米結構蕭特基二極體之侷限式表面電漿子共振生物感測系統應用於阿茲海默症初期類澱粉蛋白及濤蛋白指標檢測 (108-2221-E-002-158-) 科技部
   2019/08/01~2020/07/31 (執行中 / 主持人)

3. 短片段肺音特徵與異常音標註標準流程與病患隱私增強模組驗證方法開發
   (108-2622-E-002-012-CC3) 科技部
   2019/06/01~2020/05/31 (執行中 / 主持人)
4. 多模態深度學習演算法用以嗓音疾病之識別與分類 (106-2314-B-418-003-) 科技部
   2017/08/01~2018/10/31　已結案　共同主持人
5. 應用於阿茲海默症早期診斷的金屬 – 介電質 – 金屬結構電漿子生物感測系統研發
   (106-2221-E-002-059-MY2) 科技部
   2017/08/01~2019/07/31 (已結案 / 主持人)
6. 創新醫材加值創造與商業育成計畫 (106-2321-B-076-001-) 科技部
   2017/01/01~2018/03/31 (已結案 / 主持人)
7. 以軟體鎖相偵測與智慧手機實現無所不在的表面電漿子共振生物感測平台
   (105-2221-E-002-016-MY3) 科技部
   2016/08/01~2019/07/31 (已結案 / 主持人)

2020 與工研院團隊推動醫療級重症呼吸器原型機

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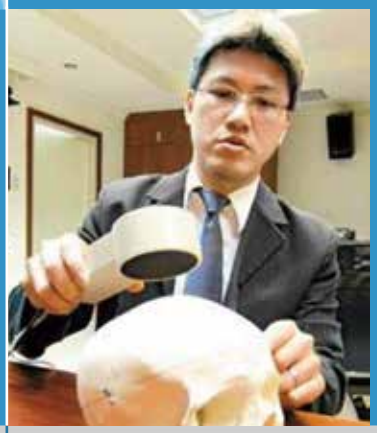

劉浩澧 教授
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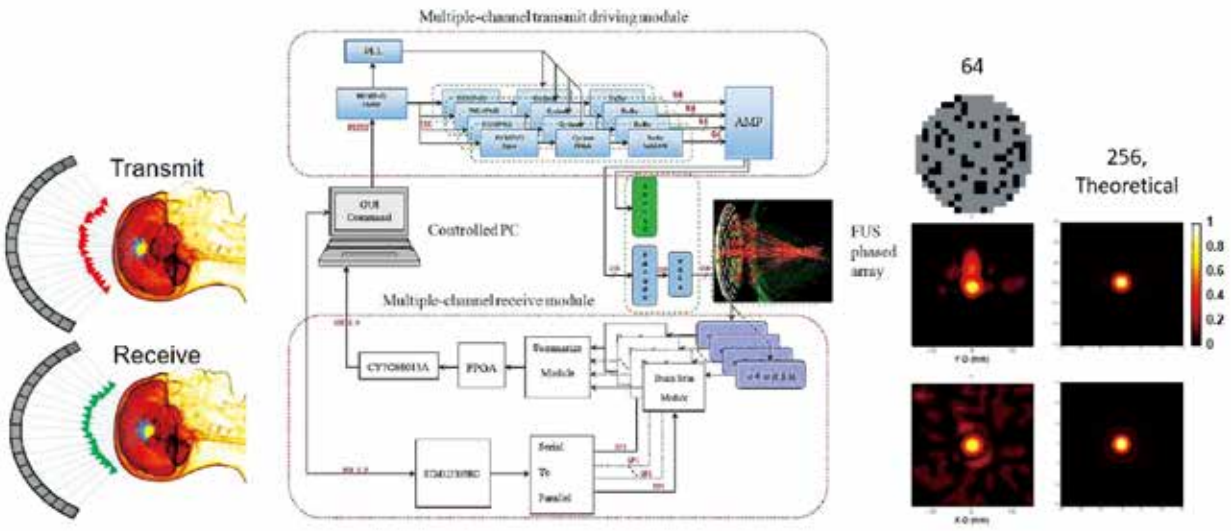
生物系統介入控制實驗室
Interventional Biosystem Control Lab

為了保護大腦組織，腦部血管發展出獨有的血腦屏障 (Blood-brain barrier，簡稱 BBB) ，此結構除了氧氣、二氧化碳和血糖外，幾乎不讓其他物質通過。大部分的藥和蛋白質由於分子結構過大，會經血腦屏障阻絕進入腦部，根據統計現有臨床治療藥物有大約 95% 以上無法順利穿透血腦屏障，造成腦部疾病如帕金森氏症、阿茲海默症、或是腦瘤疾病等，都難以使用藥物達到有效治療效果，對疾病束手無策。超音波結合灌注微泡可用於短暫無創開啟血腦屏障，目前已成為中樞神經系統疾病最有潛力的腦部藥物輸送方法。此外，超音波能量進入腦部後也可應用於神經刺激。目前此技術推動進入臨床治療的最大瓶頸之一是穿顱能量易劇烈散焦及大量頭骨折射干擾，造成焦點無法正確形成、或穿透能量因人而異、以及目前並無確實手段即使控制生物效應。為了確保超音波能量透顱後的生物效應有效性以及安全性，控制手段勢必引入，而超音波系統必須達到可即時監控超音波反射回波訊號、藉以實現適當之控制手段。其中一種可能的解決方案是設計可支援發射以及接收之雙模態超音波相控陣列系統，並開發超音波可操作在發射 / 接收雙模運行之控制技術，達到：(1) 進行透骨能量修正、從而提升超音波聚焦力及提升背散射回聲能量強度，(2) 進行能量分布之即時呈現作為治療規劃以及修正依據、以及 (3) 利用即時回波進行被動式回波檢測以及生物效應控制。

本研究團隊之主要研究方向在於提出設計多通道接超音波相控陣列控制系統，可具有即時控制能量控制以及進行被動成像，達到生物效應控制如腦部藥物釋放或神經刺激調控等。環顧國際，目前其他國際團隊實現被動成像方式均為探頭發射接收對設計 (發射與接收探頭分開)。此種設計雖具有高被散射訊號偵測靈敏度，但相位陣列製作複雜，很難進行未來商用推廣。利用雙模切換超音波進行被動成像技術，優勢為不需改變現有相位陣列設計製造，但需克服接收訊號靈敏度較低、是否可以成功進行特徵訊號擷取，因此也具有技術瓶頸須待克服。但利用雙模概念進行治療監控，目前國際間尚未有類似報導，概念原創性高。本系統概念創新，關鍵技術目前皆自有掌握，目前自有技術已與國際並駕齊驅。若成功建立此技術，預期會在腦神經科學發展上，開拓出全新的超音波研究方向。



主要研究領域 Major Research Areas

生物系統控制、精準藥物釋控 、醫用超音波、醫學電子、醫學影像及神經工程

研究計畫 Research Projects (103學年度：1030801-1050731)

科技部計畫 / 雙模聚焦式超音波陣列系統應用於血腦屏障開啟及監控
科技部計畫 / 聚焦式超音波神經調控應用於癲癇治療之可行性探討

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Chi-Kuang Sun , Distinguished Professor

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國立臺灣大學生醫電子與資訊學研究所特聘教授
國立臺灣大學光電工程學研究所特聘教授
國立臺灣大學電機工程學系特聘教授
國立臺灣大學醫療器材與影像研究所教授
中央研究院應用科學研究中心合聘研究員

Head of Core Laboratory, Molecular Imaging Center, National Taiwan University
Distinguished Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University.
Distinguished Professor, Graduate Institute of Photonics and Optoelectronics, National Taiwan University.
Distinguished Professor, Department of Electrical Engineering, National Taiwan University.
Professor, Institute of Medical Device and Imaging, National Taiwan University
Adjunct Research Fellow, Research Center for Applied Sciences, Academia Sinica.

光學分子影像核心實驗室
Optical Molecular Imaging Core Lab.

本實驗室在致力於發展非侵入式光學顯微分子影像術，以於臨床受試者或活體動物體內取得三維深層次微米解析之次細胞級影像。所發展之獨特技術包含倍頻顯微術、超解析雙光子顯微術、雙光子聲光顯微術等。所發展的技術，可於臨床受試者皮膚與黏膜內，在無傷害且不須染色切片的情況下，直接取得病理切片級的光學顯微影像 (稱之為光學虛擬切片影像)，並將此技術應用於腦神經連結影像、早期癌症檢測、次微米活體臨床神經影像、與術前、術中、術後之臨床即時檢測、手術邊緣鑑定與療效追蹤。

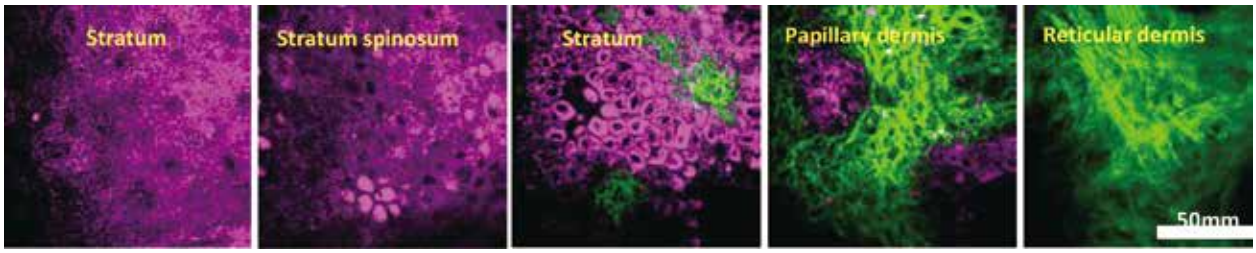
主要研究領域 Major Research Areas

主要研究領域 Major Research Areas：
非侵入式光學臨床影像、虛擬光學切片病理影像、與超解析神經影像
Non-invasive optical microscopy for clinical imaging, virtual biopsy imaging for histopathological diagnosis, super-resolution neuron imaging

研究計畫 Research Projects

1. 以光學方式觀察神經痛小鼠及病人的傷害性神經變化 (2/4): 科技部
   Visualize nociceptor changes in neuropathic mice and human patients
2. 發展先進倍頻顯微術以用於皮膚色素疾患之治療評估 (2/3): 科技部
   Advanced harmonic generation microscopy for treatment assessment of cutaneous pigmentary disorder
3. 以飛秒光纖光源建構大腦深層顯微影像平台 (1/3): 科技部
   Deep brain nonlinear imaging platform with femtosecond fiber-optic based light source

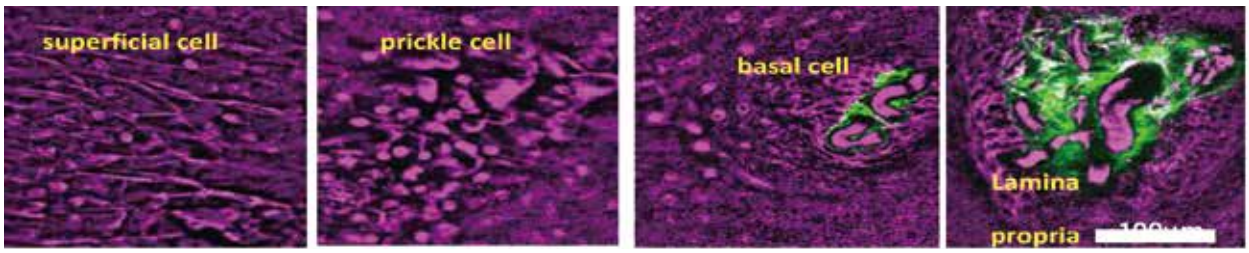
■ 代表圖及中英文說明 -1：



In *vivo* HGM images of human skin

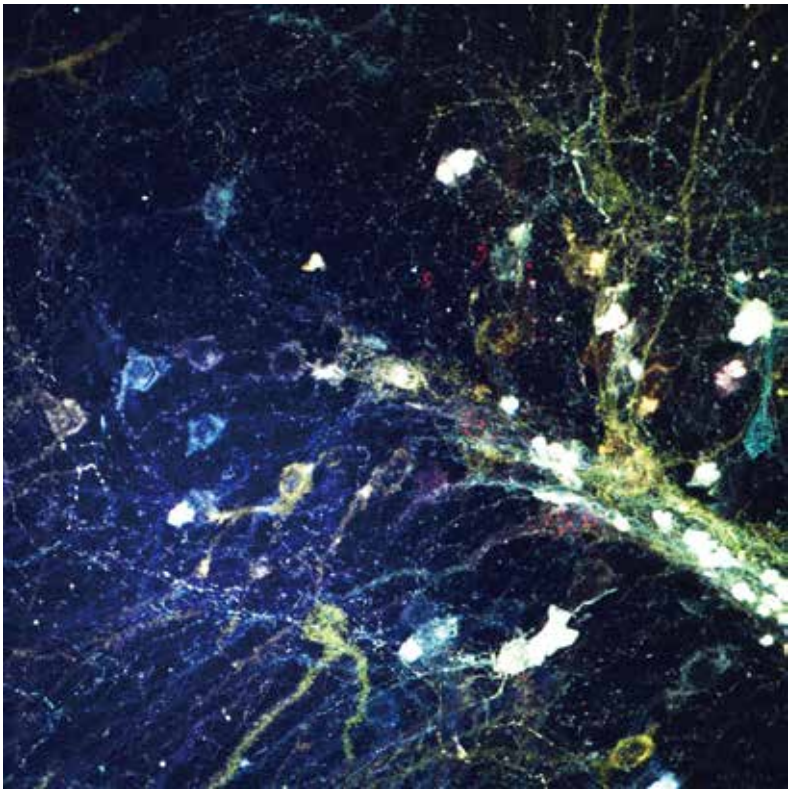
In *vivo* harmonic generation microscopic images of human skin, taken at different depths.
於人體活體皮膚不同深度所取得之倍頻式光學虛擬切片影像。

■ 代表圖及中英文說明 -2：



In *vivo* harmonic generation microscopic images of human oral mucosa, taken at different depths.
於人體活體口腔黏膜不同深度所取得之倍頻式光學虛擬切片影像。

■ 代表圖及中英文說明 -3：



Neurons surrounding the dentate gyrus of the mouse were infected by the Brainbow AAV and randomly expressed multiple fluorescent proteins. We apply this technique to reveal the detail morphological details of each distinct neuron in the interested region.

圍繞在小鼠海馬體齒狀迴的神經元，以 brainbow AAV 病毒感染，隨機表現不同顏色的螢光蛋白，以彰顯個別神經的細微結構。

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國立臺灣大學電機工程學系副教授

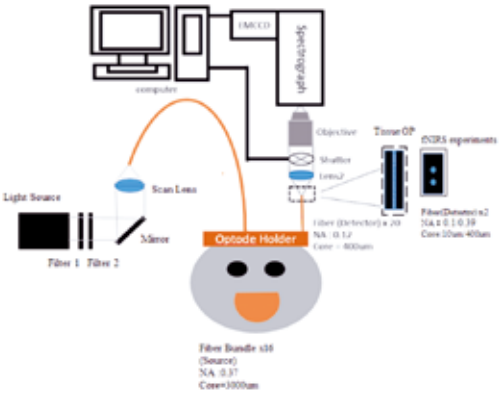
Associate Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Associate Professor, Department of Electrical Engineering, National Taiwan University

生醫光譜與影像實驗室

Biomedical Optical Spectroscopy and Imaging Lab.

我們實驗室的研究重點是以光學方法來觀察分析生物組織、細胞與分子，主要技術包含各種光譜的偵測分析以及光學影像系統的開發，以期對生物醫學領域的研究有所助益，並開發新的輔助醫學診斷的工具。長期的目標是發展可應用於活體非侵入式的工具，協助疾病如上皮癌前病變之診斷，以及生命徵象的連續長期監測。

Current research in our laboratory is focused on pushing forward optical spectroscopy and microscopy technologies and utilizing these methods to aid biomedical research and develop new diagnostic tools. The long-term objectives are to develop *in-vivo* non-invasive tools for diagnosing diseases such as epithelial precancers and continuously monitoring vital signs.



主要研究領域 Major Research Areas

生醫光電、生醫工程
Biomedical Optics, Biomedical engineering

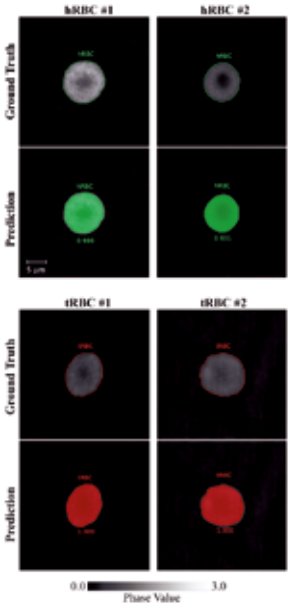
研究計畫 Research Projects

1. 經顱紅外光刺激提升大腦認知功能之即時非侵入性功效評估與優化 (主持人)
   Noninvasive, real-time evaluation and optimization of the enhancing effects on cognitive functions by transcranial infrared light stimulation (PI)
2. 基於共光路繞射斷層掃描顯微術之紅血球快速檢驗系統開發 (主持人)
   Development of rapid red blood cell screening based on common-path Tomographic Diffractive Microscopy (PI)
3. 創新非侵入式中央靜脈血氧飽和度儀 (主持人)
   Innovative and non-invasive central venous oximetry (PI)

■ **研究計畫：** 基於共光路繞射斷層掃描顯微術之紅血球快速檢驗系統開發 (Development of rapid red blood cell screening based on common-path Tomographic Diffractive Microscopy; supported by: Ministry of Science and Technology)

本研究採用共光路繞射斷層顯微術，以無需標定且快速成像之優勢獲取正常紅血球與疾病紅血球之影像。該系統藉由定量紅血球的光學參數與幾何特徵可深入對單顆紅血球進行分析。此外，採用深度學習技術進行自動化紅血球偵測與辨別異常血球，可快速分辨出異常血球，判別準確率高達 99%。

This project aims to acquire phase maps of healthy and thalassemic red blood cells (RBCs) using common-path tomographic diffractive microscopy, which have advantages of label-free and rapid imaging for high-throughput screening of various RBC-related diseases. The optical properties and morphological features of RBCs can be quantified for further single-cell analysis. In addition, a deep learning technique has been implemented to distinguish thalassemic RBCs from health ones with accuracy of about 99%.

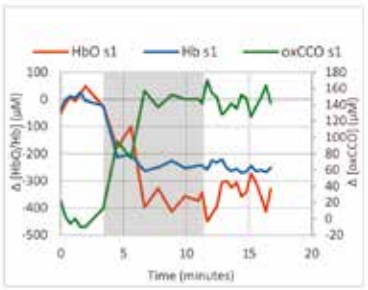


採用深度學習技術從紅血球定量相位影像辨別正常 (hRBC) 與海洋性貧血 (tRBC)
Results of implementing the Mask Region-based Convolution Neural Network technique to automatically segment RBC quantitative phase images and distinguish between healthy and thalassemic RBCs.

■ **研究計畫：** 經顱紅外光刺激提升大腦認知功能之即時非侵入性功效評估與優化 (Noninvasive, real-time evaluation and optimization of the enhancing effects on cognitive functions by transcranial infrared light stimulation; supported by: Ministry of Science and Technology)

經顱紅外光刺激 (transcranial infrared light stimulation, TILS) 是藉由頭皮照射低能量的紅光至近紅外光 (620-1100 nm)，刺激並活化腦細胞功能，在正常與年長受試者有增進專注力與短期記憶功效 ，有潛力延後失智症狀的發生或是減緩症狀。本計畫為優化 TILS 的功效，經由數值模擬以及功能性近紅外光譜 (functional Near-Infrared Spectroscopy, fNIRS) 技術以非侵入的方法測量大腦皮質中色素分子包含血紅素與細胞色素 c 氧化酶 (oxCCO) 的濃度變化，評估大腦活化程度。

Transcranial infrared light stimulation (TILS) is the use of low powered red to infrared light on the scalp to stimulate neuron function, and has been shown to improve short term memory and concentration with the potential to delay the onset of cognitive impairment. This study aims to optimize TILS by modeling and using functional near-infrared spectroscopy (fNIRS) technique to non-invasively evaluate the stimulation efficacy by measuring the changes in hemoglobin and oxidized cytochrome c oxidase (oxCCO) concentrations in the cerebral cortex.



受試者在紅外光雷射刺激時血紅素濃度的變化。灰色區域為雷射開啟時間，紅線為帶氧血紅素、藍線為不帶氧血紅素、綠色為 oxCCO 之濃度隨時間變化。由此可見雷射刺激會導致 oxCCO 濃度上升增加細胞代謝。

Chromophore concentration changes of a subject undergoing TILS. The grey area is when the laser is on, the red line is the concentration change of oxygenated hemoglobin, deoxygenated hemoglobin is blue, and oxCCO is the green line.

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Pan-Chyr Yang, Distinguished Professor

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國立臺灣大學醫學院內科教授
中央研究院生物醫學研究所合聘研究員
中央研究院院士
國立臺灣大學講座教授

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Research Fellow, Institute of Biomedical Sciences, Academia Sinica
Academician, Academia Sinica
Chair Professor, National Taiwan University

中研院生醫所

IBMS RM511

我們主要研究工作有下列四方面（1）找尋國人肺癌之危險基因。（2）建立體外癌轉移模式，全基因體搜尋癌轉移相關基因。（3）發現新的癌轉移基因及機轉做為診斷及治療標的。（4）研究癌細胞與周邊微環境之交互作用，特別是發炎細胞與癌細胞的互動。我們以 cDNA 基因微陣列研究基因之調控，訊息傳遞及功能。在基因流行病學研究我們已找到數個國人肺癌之危險基因，我們更以自己建立之肺腺癌之細胞株，利用侵襲篩選之細胞培養方式，篩選出高侵襲能力之子細胞株，並在老鼠實驗動物模式證明高侵襲肺癌細胞株也同時具有高轉移能力，利用以一體外模式及 cDNA 微陣列，我們可以全基因體找尋癌轉移之相關基因，在含 9600 基因之微陣列中我們找到近 600 個基因與肺癌轉移有關，我們將利用這些基因製成癌轉移檢測晶片推廣至臨床使用。同時在這些癌轉移相關基因中，我們發現新的抑癌轉移基因及促癌轉移基因如 Collapsin Response Mediator Protein-1 (CRMP-1)，LCRMP-1，HLJ1 及 Slug 等。這些基因在癌轉移之分子調控機制為目前主要研究之重點，且此類新的癌轉移相關蛋白也成為治療主要標誌分子，我們也用基因微陣列之研究模式，剖析這些基因之下游基因。最近，我們正著重於研究這些新的癌轉移相關蛋白之訊息傳遞途徑及功能和蛋白交互作用機制。

Our research teams are interested in studying the molecular pathogenesis of lung cancer in Taiwan and mechanisms of cancer metastasis. We focus on four aspects: (1) identification of novel risk genes for lung cancer in Taiwan, (2) molecular signature for prognostic prediction and personalized therapy of lung cancer, (3) identify novel genes and mechanisms involved in cancer metastasis for potential diagnosis and treatment targets, and (4) interaction of cancer cells and microenvironments, especially the cross talks between cancer cells and microenvironment inflammatory cells. Our team has identified several candidate risk genes for lung cancer. Cancer metastasis is a complicated process that may involve numerous genetic changes. To identify invasion/metastasis associated genes, we used DNA microarray and invasion/metastasis lung cancer cell line model and identified a panel of genes associated with

lung cancer metastasis. We also developed gene expression signature and microRNA signature that can predict survival and metastasis of lung cancer patients. These molecular signatures may be helpful for personalized therapy of lung cancer patients. We have also identified novel invasion/metastasis suppressor genes such as collapsin response mediator protein-1 (CRMP-1), long form CRMP, HLJ-1 and invasion promoting gene slug. Currently, we are investigating the molecular mechanisms and signaling pathways and protein interaction maps of these novel metastasis related genes.

主要研究領域 Major Research Areas

基因體醫學、細胞生物學、轉譯醫學
Genomic medicine, Cell Biology, Translational Medicine

研究計畫 Research Projects

1. 探討 HIPK2 與 Slug 在致癌性及癌轉移的角色
   HIPK2 regulates slug-mediated tumorigenesis and metastasis
2. 研究促癌轉移基因 Slug 在細胞週期扮演的角色
   The invasion promoter Slug is a novel cell cycle regulator
3. 整合性功能基因體學核心實驗室 II
   Integrated Core Facility for Functional Genomics (II)
4. 多功能轉錄因子 YY1 和肺癌生成關係之探討
   Multifunctional Transcription Factor YY1 and Lung Cancer Progression
5. 整合性功能基因體學核心實驗室 I
   Integrated Core Facility for Functional Genomics (I)
6. 癌轉移之外基因調控
   Epigenetic Control of Cancer Metastasis

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超解析光學影像實驗室

Light Nanoscopy Lab

超解析光學影像實驗室成立於 2019 年秋，隸屬於國立台灣大學電機工程學系與生醫電子與資訊學研究所，實驗室計畫主持人為楊東霖博士。實驗室主要研究領域除了運用超解析光學顯微鏡，了解複雜的細胞與胞器結構並回答生物問題，亦致力於新穎超解析細胞影像技術發展，透過提升解析能力、多色影像方法、影像擷取速度與影像分析方法，提供生醫研究科學所需超高解析、無繞射限制的影像資訊。

The Light Nanoscopy Lab (LNL) was started in the fall of 2019 in the Department of Electrical Engineering and the Graduate Institute of Biomedical Electronic and Bioinformatics at National Taiwan University, Taipei, Taiwan. The principal investigator is Dr. T. Tony Yang. The research at LNL focuses on providing super-resolution feature discrimination to answer biological questions and developing imaging platforms for studying proteins localization and molecular distribution in subcellular domains and organelles at the nanoscopic scale. Through pushing super-resolution limit, developing novel multicolor imaging strategy, and facilitating image acquisition and image analysis, LNL provides biological and biomedical studies on fundamental science with diffraction-unlimited image information.

主要研究領域 Major Research Areas

(1) 超高解析光學影像技術
(2) 中心粒與其附屬結構 (distal appendages) 三維形態分析
(3) 細胞主纖毛 (primary cilia) 生長和纖毛功能探討
(4) 超解析單分子追蹤。

研究計畫 Research Projects

次五奈米超高解析三維無色像差多色單分子定位顯微鏡
(科技部 , 109/04/01 ~ 112/03/31)

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國立台灣大學法律學院科際整合法律學研究所合聘臨床副教授
國立臺灣大學醫院附設醫院外科加護病房主任
國立臺灣大學醫院附設醫院外科部器官勸募小組召集人

Clinical Associate professor of Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Clinical Associate professor of surgery, National Taiwan University, College of Medicine
Clinical Associate professor of Graduate Institute of Interdisciplinary Legal Studies, College of Law, NTU
Director of Intensive Care Unit of Department of Surgery, National Taiwan University Hospital
Convener m of Organ Procurement Organization, National Taiwan University Hospital

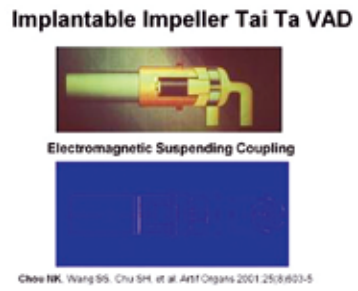
臺大醫院第七共同研究室

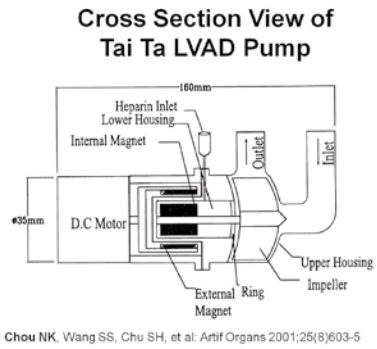
Laboratory

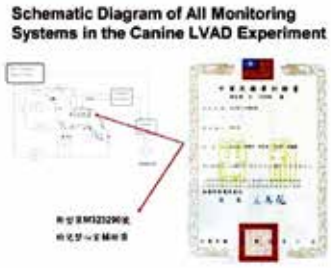
實驗室結合研究團隊的各實驗室，成員如下：應力所邵耀華教授、電機系汪重光教授、獸醫系徐久忠教授、高分子所謝國煌教授、包舜華博士、戴浩志醫師、王碩盟醫師、劉亮廷醫師。

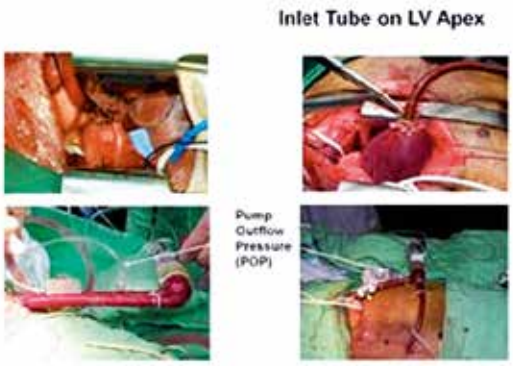
1. 小動物實驗模型
2. 醫療儀器、訊號分析處理
3. 超音波影像處理
4. 實驗室儀器：雙向心臟血管用X光射影系統、多頻道生理記錄分析系統(Polygraphy)、Injector、Autoinjector、多頻道心理生理電腦化記錄分析儀(EP recording)、CARTO、電氣生理刺激器、血管內導線壓力儀器(PressureWire)、OCT、電燒機、血管內超音波(i-LAB)、血液凝固測試儀(ACT)、波士頓科技羅塔培特控制台系統、IABP、電擊器、血中含氧測定儀、非侵入式自動血壓計、微量點滴控制器(Syringe pump)、人工心律調整器、血氧飽合濃度監視器、血壓血氧ECG監視器、電刀機、點滴幫浦、耳溫槍、血糖機、JJ電燒機等等。

Laboratory animals, animal models of heart failure and artherosclerosis, establishes computerized database for laboratory animal science and assists in various experiments, disease diagnosis, and health monitoring.









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線粒體是細胞的能量工廠，就如在電機領域中，如何有效的生產電力並配合各地電力的需求來供給客戶電力。人體透過代謝食物來獲得身體所需的分子，其中一部分分解的小分子進入細胞中的胞器粒線體 (mitochondria) 產生能量，因此粒線體常被稱為細胞的發電廠 (the powerhouse of the cell)，不斷提供身體進行各類活動所需要的能量。除了提供能量外，粒線體在細胞生理調控上扮演了許多重要的角色， 越來越多的研究指出粒線體提除了提供細胞能量，也參與細胞訊號傳遞，免疫反應，細胞死亡調控等多項生物功能。 在病理上許多的疾病，包括心血管疾病，糖尿病，癌症和神經退化性疾病也與線粒體功能障礙相關。因此我們希望能夠以系統的角度，採用了一種多學科 (multidiscipline) 的方法了解細胞中如何調節能量的產生以提供不同活動的能量需求並維持正常生離機能，及細胞內各個子系統之間的作用在功能障礙上所扮演角色。

本實驗室研究專長在於用生醫工程及系統生物學的角度來了解生物體內能量的供應與需求，研究方向為整合計算模擬與實驗，用系統生物學的角度來了解細胞能量的供應與需求。研究方法以發展線粒體與代謝相關的計算模型為基礎，並由直接的實驗測量來驗證，透過緊密的理論與實驗的配合，提供正常和病變的能量狀態的全面了解。該模型可被用於優化治療的設計，以達到最大的保護作用。並期望開發之線粒體與代謝模型，可在未來提供更全面的細胞、器官模型及藥物設計的基礎。

Mitochondria, the powerhouse of the cell, are organelles found in most types of cells. In addition to being the main site of energy production, mitochondria also play important roles in regulating ion homeostasis, and apoptosis. Mitochondrial dysfunction is related to rare inborn errors of metabolism, and some of the most common human diseases, such as cardiac vascular disease, diabetes, neurodegeneration, and cancer. Because of their important roles in basic biology and clinical medicine, mitochondria are an excellent model for systems biology.

The objective of our lab is to apply recent advances in systemic and quantitative methods to characterize the properties of crucial ion transporters in mitochondria, examine their functional roles in the mitochondrial ion circuits, and develop computational model of mitochondrial ion dynamics and energetics. The goal is to elucidate the roles of mitochondrial ion transport in energy supply and demand matching, integrated cell function, and the progression of disease. The model may ultimately be used to optimize the design of therapeutic agents in order to maximize protective effects.

主要研究領域 Major Research Areas

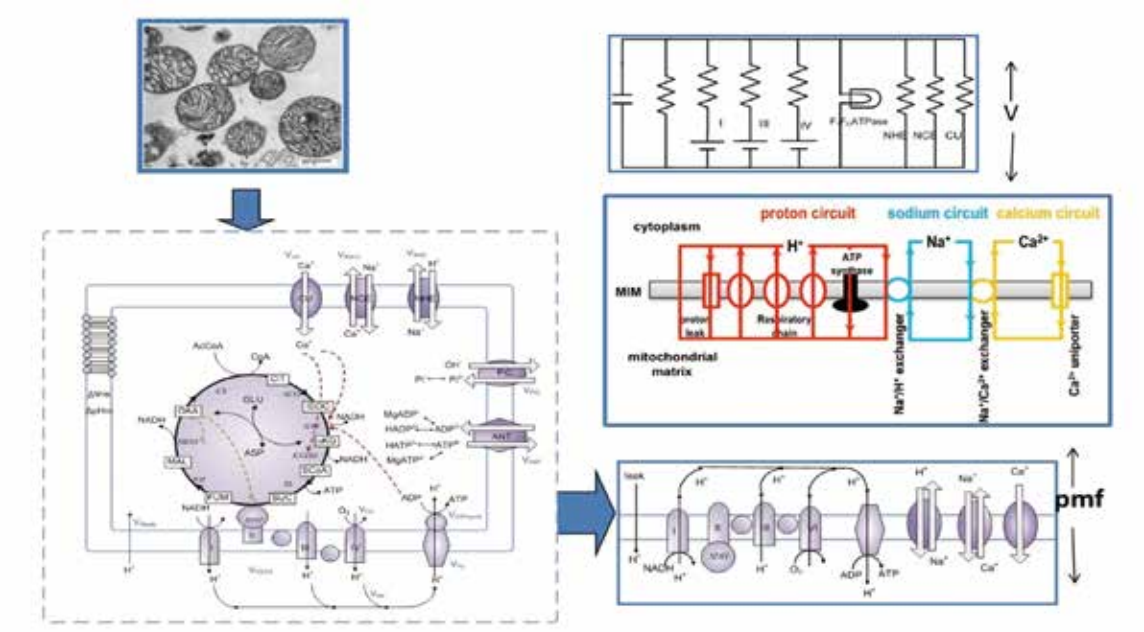
線粒體、生物能量與代謝、系統生物學、生物系統模型建構模擬

Mitochondria, bioenergetics and metabolism, systems biology, modeling and simulation of biological systems

研究計畫 Research Projects

1.【細胞線粒體的計算模型建構與模擬】

研發細胞線粒體的計算模型，整合能量代謝，離子調節，與氧化還原。結合代謝網絡及基因表現資料，以基因體層級代謝網絡重建方式建構數學模型來模擬藥物對粒線體生化反應的影響及粒線體與代謝網路的交互關係。



圖一 線粒體系統和電路模型之類比

2. 【粒線體毒性篩檢整合平台之研發】

結合最新的生醫光電技術，影像分析，研究粒線體正常與異常狀況下，其型態及動態類型的生物表型，進而理解生物物質或化學物質對粒線體產生毒性的機制，構建識別粒線體毒性之演算法。研發篩檢粒線體毒性之實驗步驟，快速識別和分類粒線體毒性，並找出檢測粒線體毒性的重要參數，進而研發多元因素的標準檢測流程。

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醫學影像處理實驗室

Medical Image Processing Lab.

乳癌是近年來已全球化的婦女死亡的主要原因，如果可以及早查出腫瘤的存在，乳癌治癒的機會將大增不少。在臨床上，電腦輔助診斷系統 (CAD) 可以幫助醫師分辨惡性和良性的乳房腫瘤，如果電腦輔助診斷系統可以提供更高的準確率，便可以大幅減少乳房切片檢查的需求。從 1998 年開始，我們致力於發展超音波電腦輔助診斷系統，也有了不錯的研究經驗與成果，成果計有 2D/3D 超音波、彩色超音波、PC-based 超音波、彈性超音波及自動超音波的電腦診斷系統。合作研究單位有美國芝加哥大學，美國 U-Systems 超音波公司，並與韓國漢城大學醫院、日本獨協大學醫院、台大醫院、台北榮總醫師均有密切合作研究。

In recent years, the breast cancer is globally the main causes of death for women. If a cancer can be found out earlier, the curability of the breast cancer will increase greatly. Clinically, the computer-aided diagnosis (CAD) systems can help physicians to differentiate the benign and malignant tumors. If the computer-aided diagnosis systems have higher accuracy, the demand of the breast biopsy can be reduced. Since 1998, we are devoted to develop the ultrasound (US) CAD systems including 2D/3D US, color Doppler US, color elastography, PC-based US, and automated US. The laboratory also collaborates with The University of Chicago and U-systems Inc., USA. We closely collaborate with physicians from Seoul National University Hospital, Dokkyo Medical University Hospital, National Taiwan University Hospital, and Taipei Veterans General Hospital.

主要研究領域 Major Research Areas

醫學影像電腦輔助診斷、人工智慧、深度學習
Medical Image Computer Aided Diagnosis, Artificial Intelligence, Deep Learning

研究計畫 Research Projects

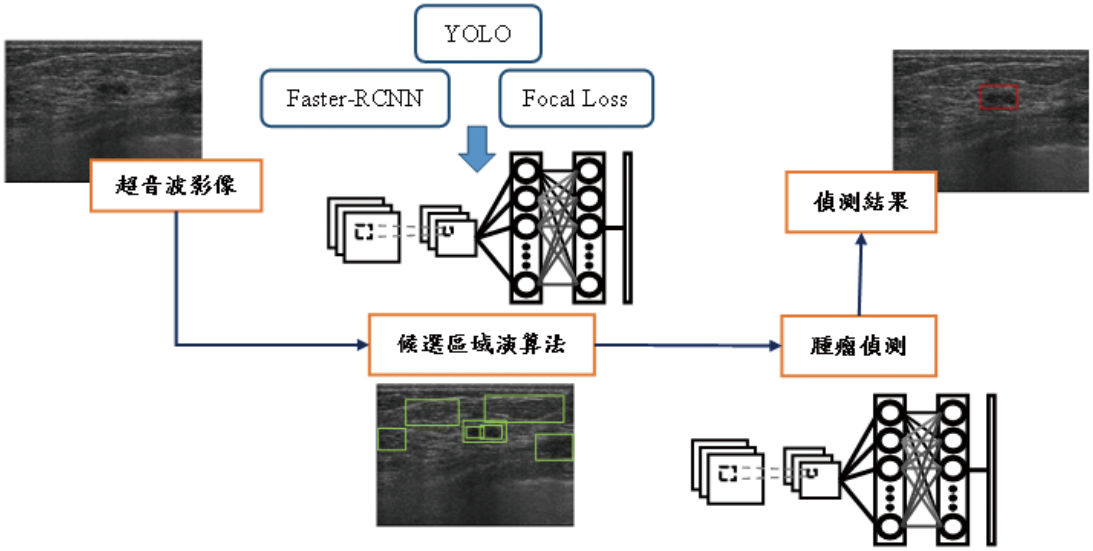
1. 應用深度學習於自動乳房超音波電腦輔助偵測與診斷 (AI 創新研究中心專案研究計畫)
   Automated Breast Ultrasound Computer-aided Detection and Diagnosis Using Deep Learning

計畫名稱：應用深度學習於自動乳房超音波電腦輔助偵測與診斷
補助單位：行政院科技部
計畫期間：2018/01/01 ~ 2021/12/31

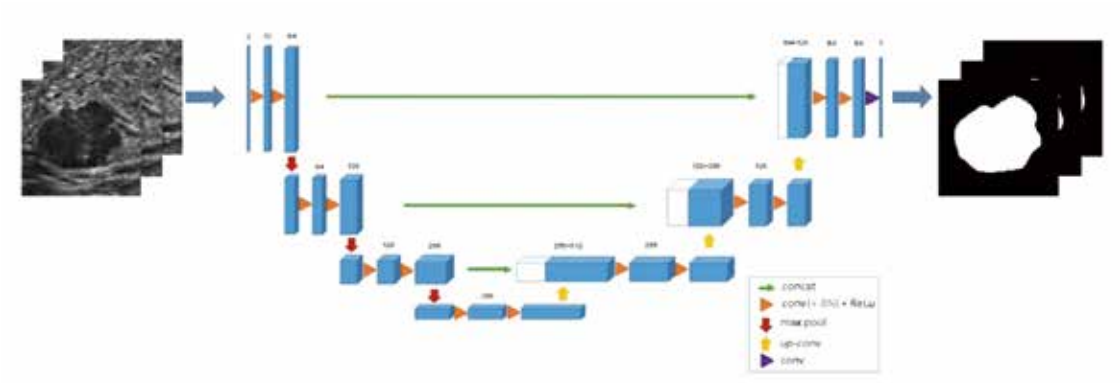
乳房超音波是常用來發現及早期診斷腫瘤良惡性的檢測方法，雖然全乳房自動超音波 (ABUS) 已被用於臨床上的檢測，但大量的影像資訊導致醫師需耗費更多專注力與時間閱片。電腦輔助系統不僅可以偵測腫瘤位置並可提供量化後腫瘤特徵資訊給醫師作為診斷基礎的工具以減少診斷時間及錯誤。如果電腦輔助系統可架設於雲端，將可不必花費鉅資購買及維護硬軟體設備即可將影像資料上傳儲存於雲端系統，同時更可利用雲端系統強大的運算能力進行更複雜的電腦輔助偵測與診斷運算。近年來，由於深度學習與雲端計算技術的發展，使得雲端機器上部署深度學習模型的應用程式是一種重要且熱門趨勢，因此，本計畫提出在雲端上提供電腦輔助系統服務，醫生可隨時隨地在任一電腦透過雲端服務立即同時取得腫瘤影像及相關診斷資訊。本計畫將以深度卷積類神經網路架構開發系統，共分四年完成，第一年完成 Two-stage ABUS 腫瘤偵測系統與 2-D 超音波雲端診斷系統。第二年改進第一年 Two-stage ABUS 腫瘤偵測系統為 One-stage、開發全卷積網路 (FCN) 的 ABUS 腫瘤切割系統以及 Two-stage 2-D 雲端腫瘤偵測系統。第三年建立 ABUS 紋理以及形狀類神經網路擷取特徵並開發診斷系統，同時開發 2-D 雲端腫瘤切割系統。第四年增加生物標記診斷系統，完成 ABUS 與 2-D 電腦輔助系統並部署在雲端上。

Project title: Automated Breast Ultrasound Computer-aided Detection and Diagnosis Using Deep Learning
Supported by: Ministry of Science and Technology
Project period: 2018/01/01 ~ 2021/12/31

Breast ultrasound is the common examination for tumor detection and classification in early stage. Although the automated whole breast ultrasound (ABUS) had been used for examination in clinic, the physician might spend more vigor and time for reviewing several thousand ultrasound images for a patient. Computer-aided system is a useful tool that provides the quantitative features about a tumor for the physician to determine a tumor as benign or malignant. If the computer-aided diagnosis system can become a cloud system, a lot of money can be saved for purchasing and maintaining the computer hardware and software. Not only the medical images could be uploaded and stored in the cloud system but also more sophisticated computer-aided diagnosis system could be implemented based on the high cloud-based computing power. Recently, due to the development of deep learning and cloud computation, it is an important trend that the systems of object detection and pattern recognition are developed based on the deep learning and deployed on the cloud server. Therefore, in this project, the computer-aided systems based on the deep learning is proposed and will be deployed on the cloud server for physician to obtain the tumor image and diagnosis information at any computer. This project will be finished in the following four years and all systems are designed based on the deep learning architecture. In the first year, the two-stage ABUS tumor detection system and 2-D ultrasound cloud tumor diagnosis system will be designed and accomplished. In the second year, we have modified the two-stage ABUS tumor detection system into one-stage detection system, developed the fully convolution network (FCN) ABUS tumor segmentation system, and two-stage 2-D cloud tumor detection system. In the third year, the ABUS texture and shape convolution neural network will be constructed for feature extraction and develop the diagnosis system. In the same time, the 2-D cloud tumor segmentation system will be developed. Finally, in the last year, the information of biomarkers will be added for designing the biomarker prediction system. In additional, the system of detection, segmentation, and diagnosis in ABUS and 2-D ultrasound will be combined respectively as a computer-aided system and deployed in the cloud.



全自動乳房超音波腫瘤偵測系統
Automated Breast Ultrasound Tumor Detection System



全自動乳房超音波腫瘤切割系統
Automated Breast Ultrasound Tumor Segmentation System

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演算法與計算生物學實驗室

Algorithms and Computational Biology Lab.

演算法與計算生物學實驗室創立於 2002 年 8 月。我們的研究主軸為「序列」與「樹狀結構」主題相關的演算法設計，以及利用這些演算法為基礎的生物資訊軟體工具開發，可說是「計算理論為體，生物資訊為用」。在過去幾年裡，我們的研究主軸是關於序列及樹狀結構上的有效演算法設計與分析。在序列方面，包括生物序列分析，如：單套體預測問題、標記 SNP、複製數目變異問題、各種不同評分準則等，以及數列分析，如：最大總和區段問題、最大平均區段問題、不同條件的最佳化問題等。在樹狀結構方面，包括樹的建構問題，如：演化樹建構、最小繞線代價伸張樹問題等，以及樹的探索問題，如：樹邊分割問題、樹的查詢問題、樹邊置換問題等。這是非常有樂趣及成果的研究歷程，我們最終的目標是開發更多關於序列及樹狀結構的基本性質，並充分運用它們來設計解決這方面計算難題的實用演算法。

The Algorithms and Computational Biology Laboratory was established in August, 2002. We are interested in all aspects of the design and analysis of combinatorial algorithms. In particular, we solve algorithmic problems arising in computational molecular biology and networking. For the past few years, we have been mostly focused on the design and analysis of efficient algorithms for analyzing sequences and trees. For sequences, we mainly work on problems related to biological sequence analysis (haplotype vs. genotype; tag SNPs; copy number variations; variant scoring schemes), and numerical sequence analysis (maximum-sum segments; maximum-average segments; other maximization criteria). For trees, we mainly work on some tree construction problems (evolutionary trees; minimum routing cost spanning trees), and tree exploring problems (tree edge partition; tree querying; swap edges). This has been a joyful and fruitful journey to us. Our ultimate goal is to reveal more properties related to sequences and trees, and fully utilize them to design practical algorithms for solving hard problems in that line of investigation.

主要研究領域 Major Research Areas

計算生物學及生物資訊學、演算法、套裝軟體
Computational Biology and Bioinformatics, Algorithms, Software Tools

研究計畫 Research Projects

大規模序列描廓的快速演算法 (108-2221-E-002-065-MY3)

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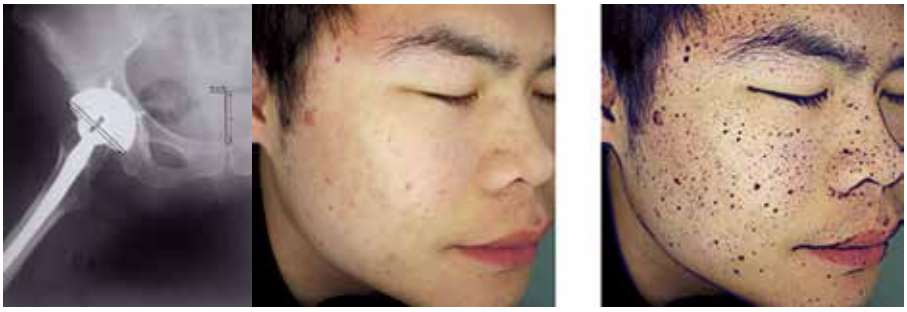
Professor, Graduate Institute of Biomedical Electronics and Bioinformatics
Department of Computer Science and Information Engineering
Graduate Institute of Networking and Multimedia, National Taiwan University

數位相機與電腦視覺實驗室

Digital Camera and Computer Vision Lab.

本實驗室由傅楸善教授成立於2003年，主要從事數位相機與電腦視覺相關研究。歷年來已執行多項研究計畫，目前以生醫數位相機、影像處理與自動光學檢測等領域為研究重點。本實驗室在上述領域已產出許多具體貢獻並在全世界有很高之能見度。此外，本實驗室之成員來自電子、資訊及醫學等各領域，多年來亦積極與國內外單位進行合作，合作夥伴包括產、研、學各界，例如：博詳科技、立景創新、晟格科技、源台精密、資策會、八維智能、佐臻、德律科技等。提升數位相機與自動光學檢測技術及其生醫應用，是本實驗室之成立宗旨與具體目標。

Digital Camera and Computer Vision Laboratory was founded by Professor Chiou-Shann Fuh in 2003, with the main research focus in digital camera and computer vision. In the past few years, we have conducted a number of research projects in digital image processing and automatic optical inspection. We have also made several critical contributions and are now one of the most visible research laboratories in this field in the world. Members of the laboratory come from various backgrounds, including electronics, informatics, and medicine. We have also been actively collaborating with research laboratories throughout the world, covering industry, research institutes, and universities, from basic sciences, engineering to clinical research, such as PowerShow Limited, Luxvisions Innovation, Chernger, ARCS Precision, III, Jorjin Technologies, D8AI, and TRI. Integrating multi-disciplinary research efforts, exploring advanced digital camera with biomedical applications, and automatic optical inspection are the mission of this laboratory.



主要研究領域 Major Research Areas

數位相機、電腦視覺、自動光學檢測、數位影像處理
Digital Camera, Computer Vision, Automatic Optical Inspection, Digital Image Processing

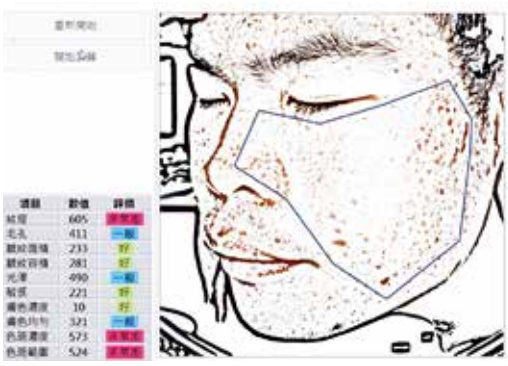
研究計畫 Research Projects

1. 傅工具：深度學習與人工智慧以擴展機器視覺瑕疵檢測
   FuhKit: Deep Learning and Artificial Intelligence to Expand Machine Vision Defect Inspection
2. 用 X 光重建錫球三維空間形狀與瑕疵檢測：二維重建，三維重建，加速計算
   3D Solder Shape Reconstruction and Defect Inspection with X-Ray Images: 2D Reconstruction, 3D Reconstruction, Computation Acceleration
3. 數位相機之影像處理：高動態範圍影像，行人偵測，性別與年齡估計
   Image Processing for Digital Cameras: High Dynamic Range Image, Pedestrian Detection, Gender and Age Estimation

- Project title:FuhKit: Deep Learning and Artificial Intelligence to Expand Machine Vision Defect Inspection
  Supported by: Ministry of Science and Techology
  Project period: 2019/08/01 ~ 2022/07/31

This is a three-year project to use computer vision and digital image processing methods to develop FuhKIT, a deep learning machine vision defect inspection software that can be used in various manufacturing fields such as Printed Circuit Board (PCB). In the first year, we will research Single Image Analysis: to train and inspect defect features of each image. In the second year, we will research Image Comparison: to train and inspect defects by focusing on the differences between two images. We will also research Multi Image Analysis: to train and inspect defects by analyzing the correlations among various images. In the third year, we will research One Class Learning: to inspect defects by training only normal images without defect images. We will use Deep Learning, CNN (Convolutional Neural Network), and AI (Artificial Intelligence). We aim to research to achieve lower FAR (False Acceptance Rate) and FRR (False Rejection Rate). We also aim to break patent and technology barriers from United States, Korea, Germany, and Japan and enhance Taiwan Automatic Optical Inspection (AOI) system competitiveness and market share in global market.

代表圖及中英文說明：Human Face Feature Detection and Analysi 人臉特徵偵測與分析



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國立臺灣大學醫學院附設醫院外科部主任
國立臺灣大學醫學院附設醫院乳房醫學中心主任

Adjunct Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Professor and Chairman, Department of Surgery, National Taiwan University College of Medicine and National Taiwan University Hospital
Director, Breast Care Center, National Taiwan University Hospital

主要研究領域 Major Research Areas

乳房外科、乳房超音波、腫瘤外科、分子流行病學
Breast Surgery, Breast Ultrasound, Surgical Oncology, Molecular Epidemiology

研究計畫 Research Projects

一、 轉譯醫學研究 Translational Medicine Research

1. 針對亞洲年輕婦女急速增加 luminal type 乳癌發展新穎治療標的與生物標記 - (總計畫與子計畫一) 以多平臺全基因微陣列方法去分析及發現不同臨床生物表現之同 Luminal A 型態乳癌的特別基因特徵
2. 驗證乳癌復發基因套組的臨床應用
3. 探討乳癌患者復發的機轉：聚焦於腫瘤內異質性，監測液態生物檢體之生物標記和尋找可能的治療方法
4. 多基因表現套組驗證於未接受輔助性化學治療乳癌病人復發之回溯性研究
5. 乳癌預後與全基因體關聯分析之回溯性流行病學研究
6. 探討 MAP3K1 和其搭檔 MAP2K4 之基因突變，變異性和蛋白質表現在管腔細胞型乳癌的分子致病機轉的意義

二、 乳房超音波及其他影像檢查研究 Breast Ultrasound and Other Imaging Screening Research

1. 自動乳房超音波之電腦輔助診斷
2. 乳房超音波電腦輔助診斷系統建置及影像評估

三、 其他研究計畫 Other Research

1. 臺灣乳癌臨床試驗合作聯盟 (Taiwan Breast Cancer Consortium)

四、 臨床試驗 Clinical Trial (enrolling patients)

1. JPBL：一項隨機分配、雙盲、安慰劑對照的第 3 期試驗，使用 fulvestrant 搭配 LY2835219 (一種 CDK4/6 抑制劑) 或單獨使用 fulvestrant 治療荷爾蒙受體陽性、HER2 陰性的局部晚期或轉移性乳癌女性患者。

2. CO40016 一項雙盲、安慰劑對照、隨機分配、第三期試驗，研究 IPATASERTIB 併用 PACLITAXEL 治療用於 PIK3CA/AKT1/PTEN 變異、局部晚期或轉移性的三陰性乳癌或激素受體陽性、HER2 陰性乳癌病患
3. WO39391/BIG 16-05 一項第三期、多中心、隨機分配、開放標示試驗，在可手術之三陰性乳癌患者中，比較 ATEZOLIZUMAB（抗 -PD-L1 抗體）併用以 ANTHRACYCLINE/TAXANE 類為主的輔助性化療與單獨的化學治療
4. DS8201-A-U302 一項第三期、多中心、隨機、開放標示、活性藥物對照在曾接受 trastuzumab 和 taxane 治療的 HER2 陽性、無法切除和 / 或轉移性乳癌受試者，比較 DS-8201a（一種抗 HER2 抗體藥物複合體）和 ado-trastuzumab emtansine（T-DM1）的試驗
5. OBI-822 一項以 adagloxad simolenin（OBI 822）/OBI 821 治療高風險早期三陰性乳癌患者（定義為接受前導性化療後有殘餘侵襲性疾病，或有 ≥ 4 處腋下淋巴結呈陽性）的第三期、隨機分配、雙盲、安慰劑對照試驗
6. EGC-002 一項隨機分配、多中心、雙盲設計的第 3 期試驗，評估 EG12014 (EirGenix Trastuzumab) 相較於 Herceptin® 作為 HER2 陽性早期乳癌病人進行含 Anthracycline/Paclitaxel 全身性治療時的前輔助治療的療效及安全性
7. MK-3475-756 一項以 Pembrolizumab 或安慰劑併用前導性化學療法和輔助性內分泌療法，治療高風險早期雌激素受體陽性、第 2 型人類表皮生長因子受體陰性 (ER+/HER2-) 乳癌的隨機分配、雙盲、第三期臨床試驗 (KEYNOTE-756)
8. TRIO033 / NATALEE 一項針對荷爾蒙受體陽性、HER2 陰性的早期乳癌患者，評估 ribociclib 加上內分泌療法作為輔助治療的療效與安全性之第三期、多中心、隨機分配、開放性試驗（以 Ribociclib 作為新輔助治療的試驗
9. TBCC-ARO DCIS 針對經乳房保留手術後之低風險和雌激素受體陽性乳腺導管原位癌去比較輔助放射線治療和低劑量泰莫西芬治療的一項國際開放標記隨機非劣性試驗
10. VIOLETTE 一項第 II 期開放性、隨機分配、多中心試驗，評估 DNA 損壞修復標靶藥物併用 Olaparib 相較於 Olaparib 單一療法，用於治療以同源重組修復 (HRR) 相關基因（包括 BRCA1/2) 不同變異組別之轉移性三陰性乳癌病患的療效與安全性
11. CO41101 一項第三期、雙盲、安慰劑對照、隨機分配試驗，評估 IPATASERTIB 合併 ATEZOLIZUMAB 及 PACLITAXEL 治療局部晚期無法切除或轉移性三陰性乳癌病患

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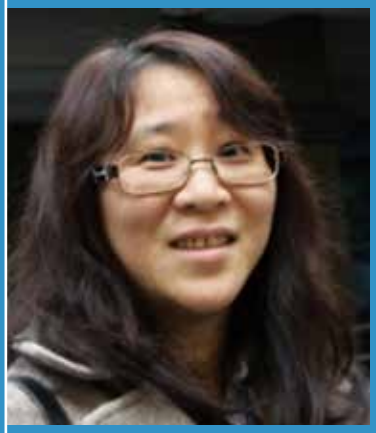

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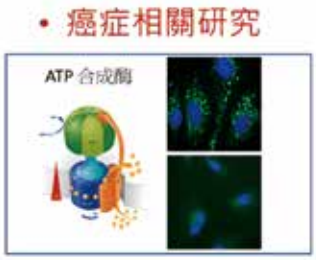
系統生物學研究室

Systems Biology Lab.

系統生物學著重於以系統的觀點來了解生物系統的運作。由於高通量藥物合成、蛋白質體、微陣列、次世代定序及生物資訊技術的發展，使得系統生物學的研究愈發可行了。生物轉變的整體研究將能加快闡明生化路徑及疾病治療的速度。除此之外，系統生物學也著重於描述和了解複雜的生物系統如何運作以及發展預測人類疾病的模式。雖然疾病生物學很複雜，而藥物開發則必需倚靠生物反應，但是“基因到藥物”的希望之路已經是一觸即發，即將成功。本研究室也運用人工智慧 (AI) 技術進行藥物和基因表現的大數據分析，尋找老藥新用的新契機，並探究藥物於抑癌的作用新機轉。

The main research in our lab is to apply systems and synthetic biology for drug discovery. We discover novel drugs for cancer therapy and investigate the molecular mechanism of drugs in cancer cells. MicroRNAs and long non-coding RNAs (lncRNAs) are non-coding RNA molecules which play a key role in post-transcriptional regulation of mRNAs. A non-coding RNA can affect many downstream targets which in turn form a complicated network. Our lab has characterized the roles of non-coding RNAs in the regulation of cellular networks and revealed that non-coding RNA-regulated network could be used as a novel therapeutic target for cancer as well as other diseases such as neurological and cardiovascular diseases.



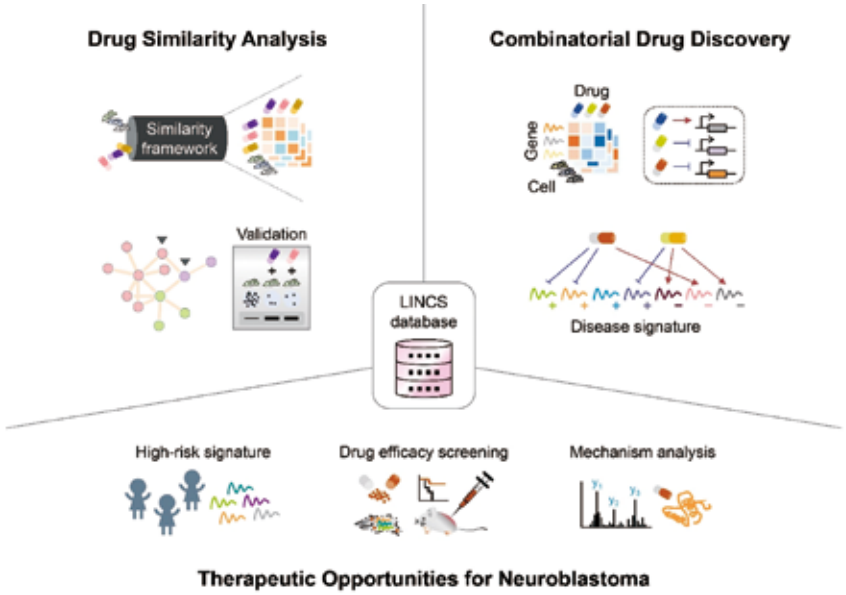
主要研究領域 Major Research Areas

系統生物學、生物資訊、癌症研究、藥物開發
Systems Biology, Bioinformatics, Cancer research, Drug discovery

研究計畫 Research Projects

1. 以基因表現巨量數據尋找高危險群神經母細胞瘤之新穎組合治療策略
   Expression-based combinatorial therapeutic discovery in high-risk neuroblastoma
2. 以蛋白體學技術探討受異位表達 ATP 合成酶運送影響之磷酸化與乙醯化交互作用動態變化
   Elucidating the interplay of phosphorylation and acetylation dynamics in ectopic ATP synthase trafficking by proteomics approaches
3. 以蛋白體學探討 ATP 合成酶如何透過胞外囊泡進行細胞與細胞間的溝通
   Role of ectopic ATP synthase in cell-cell communications mediated by extracellular vesicles
4. 以系統生物學探索神經母細胞瘤中重要的長鏈非編碼核糖核酸
   Systems biology approach for key lncRNAs in neuroblastoma

■ **研究計畫** - 以基因表現巨量數據尋找高危險群神經母細胞瘤之新穎組合治療策略
Expression-based combinatorial therapeutic discovery in high-risk neuroblastoma 之代表圖及中英文說明：



My research team has developed a series of computational and systems-biology approaches to identify new therapeutic opportunities for combinatorial drug discovery and repurposing in oncology.

我們研究團隊運用美國國家衛生研究院所資助 LINCS 計劃藥物擾動基因表現圖譜之公開巨量資料，開發一系列計算生物與系統生物學分析方法，成功地找到具有新用潛力之已上市藥以及新穎癌症組合藥物治療。

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醫學資訊實驗室

Medical Informatics Lab.

本實驗室成立於 1987 年，由賴飛羆教授所領導的研究群所組成。創立初期以研究計算機結構及低功率系統晶片設計為主，近年來改以醫療資訊系統、遠距照護、醫學資料探勘、人工智慧及機器學習等領域為主要研究方向。賴教授指導畢業的學生已超過 30 名博士生及 300 名碩士生。目前實驗室成員包括博士班 10 餘人及碩士班 10 餘人。

主要研究領域 Major Research Areas

醫學資訊　Medical Informatics

研究計畫 Research Projects

1. 臺大醫神 – 精準醫療人工智慧輔助決策系統

健康是人類目前最關心的議題。近年來醫學的蓬勃發展，除了大量的治療方式及藥物被開發出來之外，基因與疾病的關係也逐漸被瞭解。精準醫療，也就是提供每一個病患最佳的醫療計畫已不是夢想。然而醫藥知識的遽增卻也帶來解讀資訊的龐大負擔，因此 AI 便成為加值醫療產業的新希望。本計畫目標為研發一個「精準醫療 AI 輔助決策系統」，共包含四大工作項目：（1）電子病歷及醫學數據分析處理；（2）基因資訊庫與相關疾病之診斷與治療；（3）醫療期刊書籍文件資訊擷取；（4）精準醫療人工智慧開發。計畫將整合臺大醫院完整的電子病歷，涵蓋醫療、護理、檢驗、影像及復健等資料，並蒐集建立 10,000 名病患生活型態及環境因素的大數據庫；臺大基因醫學團隊將以 AI 技術探討基因結合遺傳疾病、癌症、藥物代謝及敏感、與多因子罕見疾病；臺大資訊工程團隊將以資料探勘及機器深度學習等技術，建立大數據知識網路，並研發進化基因相關疾病、肺癌、肝癌及敗血症之人工智慧決策輔助系統，再逐漸應用到所有的病人身上。分工明確且相互合作的研究團隊將致力完成本計畫。計畫成果具有國際級的高度醫學應用及學術研究價值，可顯著提升人民健康福祉，並建立起具有國際競爭力之醫療 AI 產業。

2. 智慧型傷口管理日誌 - 以人工智慧開發傷口感染及傷口癒合自動判讀為例

慢性傷口病患常不良於行，需耗費大量人力及時間成本才得以回診。考量現行傷口照護缺乏現代化資通訊技術的輔助，本計畫以臨床實務情境為主要研究場域，旨在研發智慧型傷口管理日誌手機應用程式，並整合多項資通訊及醫學影像技術。期望藉由行動醫療及智慧監測的前瞻創新應用，提供高品質且完備的智慧化傷口照護，並達到持續追蹤慢性傷口癒合狀況的目標，讓病患本身、其照護者及臨床人員皆可受惠於此。手機程式主要包含兩大功能：記錄管理、傷口感染及傷口癒合自動判讀功能。慢性傷口病患可以利用手機程式進行慢性傷口管理，包含記錄傷口照片、症狀及問卷評估等。同時藉由不同時期所拍攝的傷口照片，透過深度學習和時序影像分析，輔以傷口監測評分指標，提供慢性傷口癒合情形及風險等級之整體評估，如傷口有辨識到紅、腫、廔管或感染等不正常癒合之異常情形，可即時發送訊息通知和啟動緊急照護配套方案，以達到遠距監測和及早介入處置之目的。本計畫以資通訊技術加值醫療產業服務，可有效解決社會健康照護需求及臨床實務困境，減少病患就醫成本並提高醫療水準，具有高度醫學應用及學術研究價值，未來亦可結合各式健康雲服務，應用於長期照護等不同型態的照護機構，進而創造外部連結效益及醫療商業模式。

3. 結合多功能居家照護 ERICA 系統與基層醫療體系，建構個人化的居家照護模式，以減輕族群老化對個人與社會的衝擊

本計畫是以獨居老人為照顧目標，包括全時或部分時段獨居的老人。計畫的特點，在開發作業平台與運作架構，結合現代科技、網際網路及基層醫療體系，以受顧者為中心，兼顧人性考量、人際互動與社會連接，建構全時性、及時性、互動性的居家照顧模式，使受雇者能維持獨立自主的生活模式、與照顧者間能建立持久、信賴的互動機制，使照顧者具有成就感。而基層醫師能善盡醫療責任並藉由多元化的醫療作業模式，減輕充作壓力。此照顧模式具有廣泛的運用能力與擴展性，可以促進醫療科技的發展，也可減輕相關家屬負擔，增進其工作能力與生活品質。本計畫在研究過程將從生理、心理、社會（BPS）層面，探討獨居老人在日常生活的需求項目，開發運作平台與適用器材建立照護整合師 care manager, CM 的角色專長探討基層醫療的全時照護機制及與其他照護系統的整合模式，本計畫所需的運作成本有限，可以創造廣大的效益，具有永續經營的特點。開發運作平台與適用器材建立照護整合師 care manager 的角色專長探討基層醫療的全時照護機制及與其他照護系統的整合模式，本計畫所需的運作成本有限，可以創造廣大的效益，具有永續經營的特點。

4. 科技化與資訊化皮膚保存庫

皮膚是人體當中最大的器官，包裹在身體的表層，扮演著保護人體的重要角色。對於大面積嚴重的皮膚傷害，必須及早清創移除壞死組織，也必須給予傷口適當的覆蓋保護，使用捐贈者的皮膚（大體皮膚），仍舊是最理想的生物性敷料。因此，設置皮膚組織保存庫，處理及保存大體皮膚，在治療大面積皮膚傷害，就顯得非常重要了。近幾年來，台灣發生數起重大爆炸意外事件，造成大量大面積受傷病患，於是提升國內皮膚保存庫品質的計畫，有其必要性。為維持本院皮膚保存庫，進而提升品質至歐洲皮庫般完善，以及研發生物性人工皮膚的技術，可以成為邁向亞洲一流醫學中心的條件。本計畫預定深入研究皮膚保存方法，整合資訊系統，建置科技化與資訊化皮膚保存庫，計畫內容包含建置高規格之大體皮膚保存流程、提供高品質與安全之大體皮膚、進行大體皮膚研究、研發生物性人工皮膚、建置出入庫資訊管理系統、建置登錄系統（網路版）、整合捐贈者及受贈者電子病歷、與申請與通過衛生福利部皮膚保存庫認證。因此，在健全皮膚保存庫的架構下，提供量足質精的大體皮膚，造福更多大面積皮膚傷害的病患。

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分子生醫資訊實驗室

Molecular Biomedical Informatics Lab.

分子生醫資訊實驗室專注於設計先進的機器學習演算法以應用於生物醫學的研究上。近幾年，本實驗室與臨床醫師合作，將創新的機器學習演算法運用於臨床資料庫的分析上。主要的成果包括：

(1) 發現手術中麻醉藥的使用與罹患失智症的相關性；
(2) 發現長期服用安眠藥與罹患失智症的相關性；
(3) 發現婦女罹患子宮內膜異位與偏頭痛的相關性；
(4) 發現 4 個與精神分裂症相關的基因。

The Molecular Biomedical Informatics (MBI) laboratory focuses on design of advanced machine learning algorithms for biomedical applications. During the past few years, the MBI team has been collaborating with clinical physicians to conduct analyses on large medical databases. The main results include:

1. identified the risk of suffering dementia for patients who received anesthesia in surgery;
2. identified the risk of suffering dementia for insomnia patients who were long-term users of hypnotics;
3. identified the risk of suffering migraines for women with Endometriosis;
4. identified 4 genes that are associated with schizophrenia.

主要研究領域 Major Research Areas

生醫資訊學、機器學習　Biomedical informatics, Machine Learning

研究計畫 Research Projects

應用巨量資料探勘與地理空間資訊分析技術針對緊急救護服務之醫療資源管理、配置與未來規劃進行整體研究計畫 -- 應用巨量資料探勘方法分析緊急救護時間、空間、與醫療資訊之研究。

An integrated study on applying massive data mining and geographic information technologies to analyze the resource management, allocation, and future planning of Emergency Medical Service.

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國立臺灣大學生醫電子與資訊學研究所合聘教授

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Vice Chair, Neurobiology and Cognitive Science Center, National Taiwan University
Chair, Center for Emergency Medical Service, National Taiwan University

分子生醫資訊實驗室
Molecular Biomedical Informatics Lab.

本融合實驗室由孫維仁教授成立於 1992 年，主要工作是從臨床服務的病患需求觀點，來提供醫療儀器與資訊處理之相關整合研究和產品研發。九〇年代開始，是以病患自控式鎮痛儀 (Patient-Controlled Analgesia, PCA) 導入數位化和無線化技術為主軸的急性疼痛服務提升，開發出 i-Pain® 整合平台，並已和領先全球品牌進行緊密的結合。〇三年經歷 SARS 氣管插管爆發群聚感染的致命性災難時，本融合實驗室針對非感染性醫材的迫切市場需求，研發出可拋式內視鏡 Sunscope®，獲得經濟部學界科專和產業的贊助，朝向全球商業市場邁進。三位一體的融合實驗室成立的宗旨就是要：敞開各專業的籓籬，主動並積極的邀集跨領域人才進行多元腦力激盪，讓一切研發終極目標導向臨床應用，通過醫師嚴格的臨床驗證，確保病患實際需求獲得超值滿足，以吸引產業關注和早期資本投入。

In 1992, Professor Wei-Zen Sun founded the merger laboratory in National Taiwan University Hospital. Based on the unmet demand from patient' s perspective, we have successfully provided innovative development of medical devices and informatics through synergistic interaction among clinician, and biomedical engineer, and entrepreneur. We started by integrating the digital and wireless technology with conventional PCA pump (patient-controlled analgesia) to transform into an update web-based platform, i-Pain®. This product is currently adopted by a global leader brand and served as the major service module in Asia. In 2003, as SARS outbreak through non-protected endotracheal intubation, we developed the most advanced intubation device with disposable visual tube. This design totally eliminates the risk of air-borne lethal infection by avoiding close contact with patient' s airway. This innovative product, Sunscope®, has won a first prized award and is currently supported by government grant and industry investment. Collectively, we establish this merger laboratory to trigger brainstorming among multidisciplinary specialties and to make sure that the cross-reaction of respective domain knowledge is taken place under the goal: to put forth any helpful effort and technology in synergy, to assess the product under critical assessment of clinicians, to bring in industry investment and commercial distribution for patient welfare.

主要研究領域 Major Research Areas

臨床與生物醫學工程與產業整合、疼痛醫學、麻醉醫學、緊急醫療
Integration of Clinical Science, Biomedical Engineering and Industry; Pain Medicine; Anesthesiology; Emergent Medical Service

研究計畫 Research Projects

1. *i*-Pain® (美商赫士睿公司技術轉移 , Hospira, USA)
2. 輸液幫浦研發 (經濟部學界科專委託計畫)
3. 應用巨量資料探勘、地理空間資訊分析技術與實證醫學針對我國緊急救護服務之醫療資源配置、管理與未來規劃進行整體研究計畫 (科技部委託計畫)
4. 基於生命之鏈週期探討智慧型穿戴式裝置之臨床應用─以急重症及術後照護為例 (科技部委託計畫)

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國立臺灣大學資訊科學與工程學系教授兼副系主任
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國立臺灣大學藥物研發暨跨領域轉譯醫學與生醫工程國際研究生博士學位學程教授
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計算分子設計與代謝體學實驗室
Computataional Molecular Design and Metabolomics Lab.

本實驗室是一個跨領域的實驗室，研究的方向有兩個主軸，一是以分子結構為中心探討分子結構與活體、活性、毒性之關係，包括計算化學用在藥物設計、計算毒理學、化學資訊、生物資訊及代謝體學等，本實驗室應用物理化學、數值分析及資訊統計的技術來解決各種生物、化學及醫學方面的問題。目前主要的研究包括：1. 發展新的計算化學方法做為藥物篩選，化學結構資訊比對，臨床前藥物吸收、分佈、代謝及毒性之分析及新藥設計。 2. 應用代謝體之化學結構光譜找尋臨床上用來做為診斷、病程及癒後生物指標之結構及新藥設計。

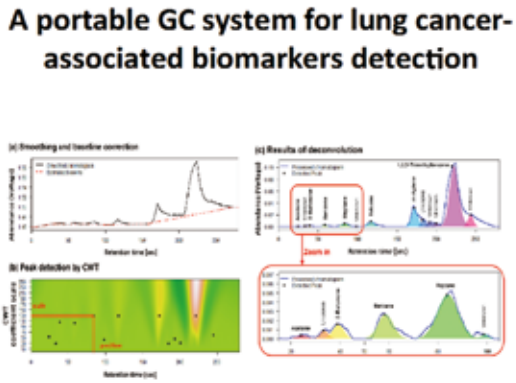
Bioinformatics and Cheminformatics Laboratory is a multidisciplinary lab. There are two main research themes in this lab. First and the major one is to analyze molecular structures such as drugs, endogenous molecules, proteins, and relate the structure for their pattern with biological activities, toxicities, and biological systems in the field of computational chemistry, computational toxicology, bioinformatics, cheminformatics, and metabonomics.

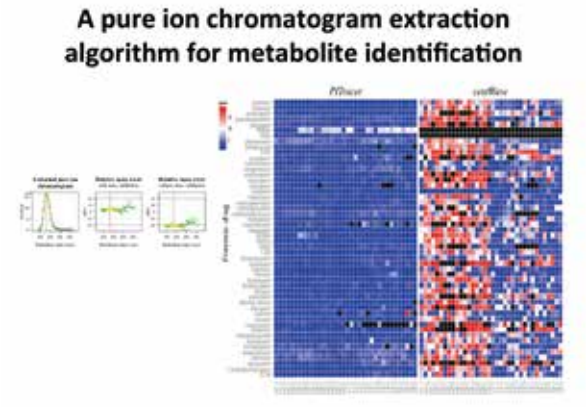
主要研究領域 Major Research Areas

計算化學及計算毒理學 ,、生物資訊學、新藥開發、代謝體學
Computational Chemistry and Toxicology, Drug Discovery, Bioinformatics, and Metabolomics

研究計畫 Research Projects

1. 以電腦模擬方式評估新興影響精神物質生理作用之研究
2. 全自動化智能藥物開發系統
3. 價創計畫：新型治療思覺失調症藥物 RS-D7 之臨床前安全試驗
4. 美國化學學會出版委員會委員、藥物開發研討會主席和學術議程委員 – 拓展國際新藥開發視野 (1/3)
5. 建構及發展藥物代謝動力學特徵及毒性人工智慧預測篩選平台





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柒 發表論文 Publications

陳志宏教授 Jyh-Horng Chen, Professor

學術期刊論文 Journal articles 學術期刊論文 Journal articles

Ai-Ling Hsu, Henry Szu-Meng Chen, Ping Hou, Changwei W. Wu, Jason M. Johnson, Kyle R. Noll, Sujit S. Prabhu, Sherise D. Ferguson, Vinodh A. Kumar, Donald F. Schomer, Jyh-Horng Chen, Ho-Ling Liu," Presurgical resting-state functional MRI language mapping with seed selection guided by regional homogeneity" , Magnetic Resonance in Medicine, Vol.84, Issue 1, (2019)

研討會論文 Conference & proceeding papers

1. Po-Wei Cheng, Edzer L. Wu, Tun Jao, Tzi-Dar Chiueh, Jyh-Horng Chen," Middle Cerebral Artery distinctness improvement in MR imaging using High-Resolution SE-WB technique" ,Organization for Human Brain Mapping, Rome, Italy, (2019) (Poster).
2. Hong-Yi Wu, Hsin-Chih Lo, Po-Wei Cheng, Jyh-Horng Chen," Preliminary Results: Comparison the Signal Change between fQSM and fMRI in Different Oxygen Concentration", World Molecular Imaging Congress, Montreal, Canada, (2019) (Poster).
3. Po-Wei Cheng, Ke-Hsin Chen, Tzi-Dar Chiueh, Jyh-Horng Chen," A Study of 2X Temporal Resolution Multi Excited W ideband EPI in V isual T ask fMRI", World Molecular Imaging Congress, Montreal, Canada, (2019) (Poster).
4. Wei-Hao Huang, Hong-Yi Wu, Yun-An Huang, Po-Wei Cheng, Chia-Ming Shih, Jyh-Horng Chen," Investigating Human Brain Negative Blood Oxygenation Level Dependent (BOLD) with Functional Quantitative Susceptibility Mapping (fQSM)", International Society for Magnetic Resonance in Medicine, virtual meeting, (2020) (accept).

成佳憲教授 Chia-Hsien Cheng, Professor

學術期刊論文 Journal articles

First-author or *corresponding-author articles

1. Huang TJ, Tien Y, Wu JK, Huang WT, Cheng JC*. Impact of breath-hold level on positional error aligned by stent/lipiodol in hepatobiliary radiotherapy with breath-hold respiratory control. BMC Cancer 20: 613, 2020 (SCI)
2. Chen YL, Hsu FM, Tsai JC, Cheng JC*. Efforts to reduce the impacts of COVID-19 outbreak on radiation oncology in Taiwan. Advances in Radiation Oncology 2020 (in press).
3. Huang WY, Tsai CL, Que JY, Lo CH, Lin YJ, Dai YH, Yang JF, Shen PC, Lee MH*, Cheng JC*. Development and validation of a nomogram for patients with non-metastatic BCLC stage C hepatocellular carcinoma after stereotactic body radiotherapy. Liver Cancer 9: 326-337, 2020 (SCI)
4. Tien Y, Tsai CL, Hou WH, Chiang Y, Hsu FM, Tsai YC, Cheng JC*. Targeting human epidermal growth factor receptor 2 enhances radiosensitivity and reduces the metastatic potential of Lewis lung carcinoma cells. Radiation Oncology 15: 58, 2020 (SCI)
5. Chiang Y, Wang CC, Tsai YC, Huang CY, Pu YS, Lin CC*, Cheng JC*. Nuclear factor-κB overexpression is correlated with poor outcomes after multimodality bladder-preserving therapy in patients with muscle-invasive bladder Cancer. Journal of Clinical Medicine 8:1954, 2019 (SCI)

6. Tsai CL, Cheng JC*. Evolving development of multi-parametric normal tissue complication probability model for liver radiotherapy Translational Cancer Research 8(Suppl 2): S120-S123, 2019 (Editorial)

7. Lu SL, Hsu FM, Tsai CL, Lee JM, Huang PM, Hsu CH, Lin CC, Chang YL, Hsieh MS, Cheng JC*. Improved prognosis with induction chemotherapy in pathological complete responders after trimodality treatment for esophageal squamous cell carcinoma: Hypothesis generating for adjuvant treatment. European Journal of Surgical Oncology 45:1498-1504, 2019 (SCI)

Other-authorship peer-review articles

8. Niu H, Zhang L, Chen YH, Yuan BY, Wu ZF, Cheng JC, Lin Q, Zeng ZC. Circular RNA TUBD1 acts as the miR-146a-5p sponge to affect the viability and pro-inflammatory cytokine production of LX-2 cells through the TLR4 pathway. Radiation Research 193;383-393 2020 (SCI)

9. Lu YC, Kuo MC, Hong JH, Jaw FS, Huang CY, Cheng JC, Kung HN. Lower postoperative natural killer cell activity is associated with positive surgical margins after radical prostatectomy. Journal of the Formosan Medical Association 2020 (SCI) (in press)

10. Kim N, Cheng JC, Jung I, Liang J, Shih YL, Huang WY, Kimura T, Lee VH, Zeng ZC, Zhenggan R, Kay CS, Heo SJ, Won JY, Seong J*. Stereotactic body radiation therapy vs. radiofrequency ablation in Asian patients with hepatocellular carcinoma. Journal of Hepatology 73:121-129, 2020 (SCI)

11. Rim CH, Cheng JC, Huang WY, Kimura T, Lee V, Zeng ZC, Seong J. An evaluation of hepatocellular carcinoma practice guidelines from a radiation oncology perspective. Radiotherapy and Oncology 148:73-81, 2020 (SCI)

12. Lin WZ, Chen XC, Chen T, Liu J, Ye YL, Chen L, Qiu XX, Cheng JC, Zhang LR, Wu JX*, Qiu SF*. C1QTNF6 as a novel diagnostic and prognostic biomarker for clear cell renal cell carcinoma. DNA and Cell Biology 39:1000-1011, 2020 (SCI)

13. Park K, Vansteenkiste J, Lee KH, Pentheroudakis G, Zhou C, Prabhaah K, Seto T, Voon JP, Tan DSW, Yang JCH, Wang J, Govind Babu K, Nakayama Y, Alip A, Chua KLM, Cheng JCH, Senan S, Ahn YC, Kim TY, Ahn HK, Peters S, Yoshino T, Douillard JY. Pan-Asian adapted ESMO clinical practice guidelines for the management of patients with locally-advanced unresectable non-small-cell lung cancer: a KSMO-ESMO initiative endorsed by CSCO, ISMPO, JSMO, MOS, SSO and TOS. Annals of Oncology 2020 (SCI) (in press)

14. Huang TC, Lin CC, Wu YC, Cheng JC, Lee JM, Wang HP, Huang PM, Hsu FM, Yeh KH, Cheng AL, Tzen KY, Hsu CH. Phase II study of metabolic response to one-cycle chemotherapy in patients with locally advanced esophageal squamous cell carcinoma. Journal of the Formosan Medical Association 118; 1024-1030, 2019 (SCI)

15. Lin YC, Wang YJ, Cheng JC, Lin YH. Contactless monitoring of pulse rate and eye movement for uveal melanoma patients undergoing radiation therapy. IEEE Transactions and Measurements 68:474-482, 2019 (SCI)

16. Chen GY, Cheng JC, Chen YH, Lu MY, Chang HH, Yang YL, Jou ST, Hsu WM, Kuo, SH. Local control and clinical outcome of high-risk pediatric neuroblastoma patients after receiving multimodality treatment and helical tomotherapy. Anticancer Research 39;2207-2215, 2019 (SCI)

17. Yuan BY, Chen YH, Wu ZF, Zhuang Y, Chen GW, Zhang L, Zhang HG, Cheng JC, Lin Q, Zeng ZC. MicroRNA-146a-5p attenuates fibrosis-related molecules in irradiated and TGF-beta1-Treated human hepatic stellate cells by regulating PTPRA-SRC signaling. Radiation Research 192;321-329, 2019 (SCI)

18. Yuan B, Chen Y, Wu Z, Zhang L, Zhuang Y, Zhou X, Niu H, Cheng JC, Zeng Z. Proteomic profiling of human hepatic stellate cell line LX2 responses to irradiation and TGF-β1. Journal of proteome research 18; 508-521, 2019 (SCI)

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1. Cheng JC, Hsu FM, Lee JM, Huang PM, Guo JC, Hsu CH. A prospective study on serum PD-L1, TGF-1, and VEGF-A as immune-integrated biomarkers for locally advanced esophageal squamous cell carcinoma. The 2019 Annual Meeting of American Society for Radiation Oncology (ASTRO), September 15-18, 2019

2. Radiosensitization in cancer treatment with gold nanoparticles through synergistic sonoporation, Lu SL, Liu WW, Cheng JC*, Lin LC, Wang CRC, Li PC. IEEE International Ultrasonics Symposium, IUS 2019

莊曜宇教授 Eric Y. Chuang, Professor

學術期刊論文 Journal articles

1. P.H. Ko, Y.C. Shen, K. Murugan, C.W. Huang, G. Sivakumar, P. Pal, C.C. Liao, K.S. Luo, E.Y. Chuang, M.H. Tsai, L.C. Lai, Macrophage Migration Inhibitory Factor Acts as the Potential Target of a Newly Synthesized Compound, 1-(9′-methyl-3′-carbazole)-3, 4-dihydro-β-carboline, SCI REP-UK(impact factor: 4.011, journal ranking: 22%), FEB 14 2019, 9:2147, DOI: 10.1038/s41598-019-38590-y

2. T.T. Wang, C.Y. Lee, L.C. Lai, M.H. Tsai, T.P. Lu, E.Y. Chuang*, anamiR: integrated analysis of MicroRNA and gene expression profiling, BMC BIOINFORMATICS(impact factor: 2.511, journal ranking: 15%), MAR 4 2019, 20:239, DOI: 10.1186/s12859-019-2870-x

3. C.S. Hsieh, P.S. Huang, S.N. Chang, C.K. Wu, J.J. Hwang, E.Y. Chuang*, C.T. Tsai, Genome-Wide Copy Number Variation Association Study of Atrial Fibrillation Related Thromboembolic Stroke, J CLIN MED(impact factor: 5.688, journal ranking: 9%), MAR 9 2019, 8(3):332, DOI: 10.3390/jcm8030332.

4. P.H. Ko, C.W. Huang, H.H. Chang, Eric Y. Chuang, M.H. Tsai, L.C. Lai, Identifying the functions and biomarkers of Codonopsis pilosula and Astragalus membranaceus aqueous extracts in hepatic cells, CHIN MED-UK(impact factor: 2.265, journal ranking: 33%), MAR 20 2019, (2019) 14:10, DOI: 10.1186/s13020-019-0233-1

5. C.H. Lin, C.C. Chen, H.L. Chiang, J.M. Liou, C.M. Chang, T.P. Lu, E.Y. Chuang, Y.C. Tai, C. Cheng, H.Y. Lin, M.S. Wu, Altered gut microbiota and inflammatory cytokine responses in patients with Parkinson′ s disease, J NEUROINFLAMM(impact factor: 5.7, journal ranking: 15%), JUN 27 2019, 16:129, DOI: 10.1186/s12974-019-1528-y

6. C.Y. Lee, A. Chattopadhyay, L.M. Chiang, J.M. Jimmy Juang, L.C. Lai, M.H. Tsai, T.P. Lu, E.Y. Chuang*, VariED: the first integrated database of gene annotation and expression profiles for variants related to human diseases, DATABASE-OXFORD(impact factor: 3.683, journal ranking: 12%), JUL 17 2019,Volume 2019, 2019, baz075, DOI: 10.1093/database/baz075

7. L.C. Lai, Q.L. Sun, Y.A. Chen, Y.W. Hsiao, T.P. Lu, M.H. Tsai, L. Zhu, E.Y. Chuang*, W.T. Fang, Using proteomic profiling to characterize protein signatures of different thymoma subtypes, BMC Cancer(impact factor: 2.933, journal ranking: 53%), AUG 13 2019, (2019) 19:796, DOI: 10.1186/s12885-019-6023-4

8. L.H. Chen, C.Y. Liao, L.C. Lai, M.H. Tsai, Eric Y. Chuang*, Semaphorin 6A Attenuates the Migration Capability of Lung Cancer Cells via the NRF2/HMOX1 Axis, SCI REP-UK(impact factor: 4.011, journal ranking: 22%), SEP 16 2019, (2019) 9:13302, DOI: 10.1038/s41598-019-49874-8

9. J.M. Liou, C.C. Chen, C.M. Chang, Y.J. Fang, M.J. Bair, P.Y. Chen, C.Y. Chang, Y.C. Hsu, M.J. Chen, C.C. Chen, J.Y. Lee, T.H. Yang, J.C. Luo, C.Y. Chen, W.F. Hsu, Y.N. Chen, J.Y. Wu, J.T. Lin, TP Lu, EE.Y. Chuang, Emad M El-Omar, MS. Wu, Long-term changes of gut microbiota, antibiotic resistance, and metabolic parameters after Helicobacter pylori eradication: a multicentre, open-label, randomised trial, LANCET INFECT DIS (impact factor: 27.516, journal ranking: 1%), OCT 1 2019, (19)10: 1109-

1120, DOI: 10.1016/S1473-3099(19)30272-5

10. P.H. Ko, G. Lenka, Y.A. Chen, Eric Y. Chuang, M.H. Tsai, Y.P. Sher, L.C. Lai, Semaphorin 5A suppresses the proliferation and migration of lung adenocarcinoma cells, INT J ONCOL(impact factor: 3.571, journal ranking: 37%), December 2 2019, 56: 165-177, DOI: 10.3892/ijo.2019.4932

11. J.M. Jimmy Juang, Y.B. Liu, C.Y. Julius Chen, Q.Y. Yu, A. Chattopadhyay, L.Y. Lin, W.J. Chen, C.C. Yu, H.C. Huang, L.T. Ho, L.P. Lai, J.J. Hwang, T.T. Lin, M.C. Liao, J.J. Chen, S.F. Sherri Yeh, J.Y. Chuang, D.H. Yang, J.L. Lin, T.P. Lu, Eric Y. Chuang, M.J. Ackerman, Validation and Disease Risk Assessment of Previously Reported Genome-Wide Genetic Variants Associated with Brugada Syndrome: SADS-TW BrS Registry, CIRC-CARDIOVASC GENE(impact factor: 4.897, journal ranking: 15%), 3 Jun 2020, DOI: 10.1161/CIRCGEN.119.002797

12. C.C. Chen, W.K. Wu, C.M. Chang, S. Panyod, T.P. Lu, J.M. Liou, Y.J. Fang, Eric Y. Chuang, M.S. Wu, Comparison of DNA stabilizers and storage conditions on preserving fecal microbiota profiles, J FORMOS MED ASSOC(impact factor: 2.844, journal ranking: 22%), 26 February 2020, DOI: 10.1016/j.jfma.2020.01.013

黃念祖副教授 Nien-Tsu Huang, Associate Professor

學術期刊論文 Journal articles

1. Da-Han Kuan, and Nien-Tsu Huang*, "Recent advancements in microfluidics that integrate electrical sensors for whole blood analysis" Analytical Methods, in press, 2020/06. (Fields: Spectroscopy: 13/42, SCI, Impact Factor: 2.60)

2. Hsiu-Kang Huang, Ho-Wen Cheng, Cheng-Chieh Liao, Shang-Jyun Lin, Yi-Zih Chen, Juen-Kai Wang, Yuh-Lin Wang, Nien-Tsu Huang, "Bacteria Encapsulation and Rapid Antibiotic Susceptibility Test Using a Microfluidic Microwell Device Integrating Surface-enhanced Raman Scattering", Lab on a Chip, in press, 2020/06. (Fields: Biochemical research methods: 6/72, SCI, Impact Factor: 6.91)

3. Richard Lee Lai, and Nien-Tsu Huang*, "Dimensional analysis and parametric studies of the microwell for particle trapping", Microfluidics and Nanofluidics, 23: 121, (2019) (Fields: Instruments & Instrumentation: 17/58, SCI, Impact Factor: 2.38)

4. Kai-Wei Chang, Ho-Wen Cheng, Jessie Shiue, Juen-Kai Wang, Yuh-Lin Wang, Nien-Tsu Huang*, "Antibiotic Susceptibility Test with Surface-Enhanced Raman Scattering in a Microfluidic System", Analytical Chemistry, 91, 17, 10988-10995, 2019. (Fields: Chemistry, analytical: 7/84, SCI, Impact Factor: 6.35, Citation number: 7)

5. Yi-Ying Wang, Ho-Wen Cheng, Kai-Wei Chang, Jessie Shiue, Juen-Kai Wang, Yuh-Lin Wang, and Nien-Tsu Huang*, "A particle-based microfluidic molecular separation integrating surface-enhanced Raman scattering sensing for purine derivatives analysis", Microfluidics and Nanofluidics (2019) 23: 48. (Fields: Instruments & Instrumentation: 17/58, SCI, Impact Factor: 2.38)

6. Sheng-Han Chu, Li-Lun Lo, T. Tony Yang, Jung-Chi Liao, and Nien-Tsu Huang*, "A microfluidic device for in situ fixation and super-resolved mechanosensation studies of primary cilia", Biomicrofluidics 13, 014105, 2019. (Fields: Physics, Fluids & Plasmas: 10/31, SCI, Impact Factor: 2.57)

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1. C. Liao, H. Huang, Y. Chen and N. Huang, "The Microfluidic Microwell Device Integrating Surface Enhanced Raman Scattering for Bacteria Enrichment and in Situ Antibiotic Susceptibility Test," 2020 IEEE 33rd International Conference on Micro Electro Mechanical Systems (MEMS), Vancouver, BC, Canada, 2020, pp. 1048-1051.

2. Kai-Wei Chang, and Nien-Tsu Huang, "A Microfluidic System Integrating Membrane Filtration and Surface-Enhanced Raman Scattering for Rapid Antibiotic Susceptibility test", μTAS 2019, Basel, Switzerland, October 27 to 31, 2019.

3. Sheng-Han Chu, and Nien-Tsu Huang, "Determining mechanical stimulation responses of primary cilia with an integrated microfluidic platform", μTAS 2019, Basel, Switzerland, October 27 to 31, 2019.

4. Hsiu-Kang Huang, Nien-Tsu Huang, "A Microfluidic Microwell Device Integrating Surface-enhanced Raman Scattering for Rapid Antibiotic Susceptibility Test of Blood-Borne Pathogen", IEEE NEMS 2019, Singapore, April

11 to 14, 2019.

5. Chi-Chen Lin, Jhih-Siang Chen, Chien-Lin Wu, Lon A. Wang, Nien-Tsu Huang," A Nanodisk Array Based Localized Surface Plasmon Resonance (LSPR) Sensor Fabricated by Laser Interference Lithography" , IEEE NEMS 2019, Singapore, April 11 to 14, 2019.

鍾孝文教授 Hsiao-Wen Chung, Professor

學術期刊論文 Journal articles

1. Chien CP, Chiu FM, Shen YC, Chen YH, Chung HW. Magnetic resonance cholangiopancreatography in a single breath-hold: comparative effectiveness between 3D gradient- and spin-echo and 2D thick-slab fast spin-echo acquisitions. Quantitative Imaging in Medicine and Surgery 2020;10:1265-1274.
2. Liu YJ, Lee YH, Chang HC, Chung HW, Wang CW, Juan CH, Chu YH, Lee JC, Juan CJ. Imaging quality of PROPELLER diffusion-weighted MR imaging and its diagnostic performance in distinguishing pleomorphic adenomas from Warthin tumors of the parotid gland. NMR in Biomedicine 2020;33:e4282.
3. Chu ML, Chien CP, Wu WC, Chung HW. Gradient- and spin-echo (GRASE) MR imaging: a long-existing technology that may find wide applications in modern era. Quantitative Imaging in Medicine and Surgery 2019;9:1477-1484.
4. Lai PH, Chung HW, Chang HC, Fu JH, Wang PC, Hsu SH, Hsu SS, Lin HS, Chuang TC. Susceptibility-weighted imaging provides complementary value to diffusion-weighted imaging in the differentiation between pyogenic brain abscesses, necrotic glioblastomas, and necrotic metastatic brain tumors. European Journal of Radiology 2019;117:56-61.
5. Tsai PH, Chen YC, Chiang SW, Huang TY, Chou MC, Liu HS, Chung HW, Peng GS, Ma HI, Kao HW, Chen CY. Changes in sensorimotor-related thalamic diffusion properties and cerebrospinal fluid hydrodynamics predict gait responses to tap test in idiopathic normal-pressure hydrocephalus. European Radiology 2018;28:4504-4513.
6. Liu HS, Chiang SW, Chung HW, Tsai PH, Hsu FT, Cho NY, Wang CY, Chou MC, Chen CY. Histogram analysis of T2*-based pharmacokinetic imaging in cerebral glioma grading. Computer Methods and Programs in Biomedicine 2018;155:19-27.
7. Kuo YS, Yang SC, Chung HW, Wu WC. Toward quantitative fast diffusion kurtosis imaging with b-values chosen in consideration of signal-to-noise ratio and model fidelity. Medical Physics 2018;45:605-612.
8. Chu ML, Chang HC, Chung HW, Bashir MR, Cai J, Zhang L, Sun D, Chen NK. Free-breathing abdominal MRI improved by Repeated k-t-subsampling and artifact-minimization (ReKAM). Medical Physics 2018;45:178-190.

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1. Chien CP, Chiu FM, Chung HW (2020) MR cholangiopancreatography in a single breath-hold: comparative effectiveness between 3D GRASE and 2D thick-slab SSFSE, in International Society of Magnetic Resonance in Medicine, 28th Annual Meeting, #2188, Paris, France.
2. Lin CC, Wu WC, Shyu WC, Liu YJ, Chang HC, Luo YC, Chen DC, Lin CW, Chung HW, Lin SZ (2020) Angiogenesis following peripheral blood stem cell therapy: evidence from perfusion MRI of patients with ischemic stroke, in International Society of Magnetic Resonance in Medicine, 28th Annual Meeting, #2375, Paris, France.
3. Li WS, Lin KY, Chen HL, Chen JP, Chen SY, Li CM, Xu RF, Chiueh TD, Chung HW, Chen N, Chang SC (2020) Student engagement in the co-designing and co-teaching cornerstone course of EECS design and implementation at National Taiwan University, in 6th International Conference on

Higher Education Advances, Valencia, Spain.

4. Tsai PH, Su TJ, Liu HS, Hsu FT, Kao YC, Lu CF, Chung HW, Chen CY (2019) Quantitative R2 mapping reveals information of myelin content in rat brain at 7T, in International Society of Magnetic Resonance in Medicine, 27th Annual Meeting, #2621, Montreal, Canada.
5. Tsai PH, Liu HS, Hsu FT, Kao YC, Lu CF, Chung HW, Chen CY (2018) Sequential changes of diffusion anisotropy and mean kurtosis in cuprizone-induced demyelination: a rat model, in International Society of Magnetic Resonance in Medicine, 26th Annual Meeting, #1853, Paris, France.
6. Yu CY, Huang TY, Chung HW (2018) Single breath-hold MR T1-mapping in the heart: comparison of hybrid MOLLI and MOLLI53, in International Society of Magnetic Resonance in Medicine, 26th Annual Meeting, #2916, Paris, France.
7. Cheng CM, Yeh TC, Hsieh JC, Chung HW (2018) MR susceptometry based superior sagittal sinus venous oxygen saturation: effects of carbon dioxide based cerebral vascular reserve and anesthesia in Moyamoya patients, in International Society of Magnetic Resonance in Medicine, 26th Annual Meeting, #4934, Paris, France.

管傑雄教授 Chieh-Hsiung Kuan, Professor

學術期刊論文 Journal articles

1. Chun Nien, Li-Cheng Chang, Jia-Hao Ye, Vin-Cent Su, Chao-Hsin Wu and Chieh-Hsiung Kuan (Aug, 2017). Proximity effect correction in electron-beam lithography based on computation of critical-development time with swarm intelligence. Journal of Vacuum Science & Technology B.
2. Li-Cheng Chang, Chun Nien, Jia-Hao Ye, Cheng-Huan Chung, Vin-Cent Su, Chao-Hsin Wu, and Chieh-Hsiung Kuan (Sept, 2017). A comprehensive model for sub-10nm electron-beam patterning through the shorttime and cold development. Nanotechnology.
3. Li-Cheng Chang, Chun Nien, Jia-Hao Ye, Cheng-Huan Chung, Vin-Cent Su, Chao-Hsin Wu, and Chieh-Hsiung Kuan (Sept, 2017). A comprehensive model for sub-10nm electron-beam patterning through the shorttime and cold development. Nanotechnology.
4. Kung-Chu Ho, Vin-Cent Su, Da-Yo Huang, Ming-Lun Lee, Nai-Kuan Chou, Chieh-Hsiung Kuan (Nov, 2017). Investigation of low frequency electrolytic solution behavior with an accurate electrical impedance method. Chemical Physics Letters.
5. Chen, P. H., Su, V. C., Wu, S. H., Lin, R. M., & Kuan, C. H (Jan, 2018). Defect reduction in GaN on dome-shaped patterned-sapphire substrates. Optical Materials.
6. Shuming Wang, Pin Chieh Wu, Vin-Cent Su, Yi-Chieh Lai, Mu-Ku Chen, Hsin Yu Kuo, Bo Han Chen, Yu Han Chen, Tzu-Ting Huang, Jung-Hsi Wang, Ray-Ming Lin, Chieh-Hsiung Kuan, Tao Li, Zhenlin Wang, Shining Zhu & Din Ping Tsai (Jan, 2018). A broadband achromatic metalens in the visible. Nature Nanotechnologyvolume.
7. Liang, B. W., Huang, C. C., Chao, S. P., Kao, K. J., Simbulan, K. B., Lan, Y. W., & Kuan, C. H. (Jan, 2020). Responsivity and detectivity enhancements by graphene overlay on normal-incident multicolor quantum grid infrared photodetectors. Optics Express, 28(2), 2456-2465.

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1. Chun Nien, Yi-Hsuan Li, Vin-Cent Su, Chieh-Hsiung Kuan (Mar, 2017). Ultra-sensitive molecular detection using surface-enhanced Raman scattering on periodic metal-dielectric nanostructures. SPIE Proceedings.

Vin-Cent Su, Po-Hsun Chen, Ta-Cheng Hsu, Yu-Yao Lin, Chieh-Hsiung Kuan (May, 2017). Enhanced Internal-Quantum Efficiency of GaN-based Light-Emitting Diodes with a Larger Post-Duty Cycle of Patterned-Sapphire Substrates. 2017 The Conference on Lasers and Electro-Optics (CLEO 2017).

2. Cheng Yen Chiena , Chiu Chang Huanga , Chen Kai Yi, Cheng Wei Yena , and Chieh-Hsiung Kuan.(May, 2019) Advanced HEMT Characteristics of Epitaxial Quality-improved GaN by Using Patterned Sapphire .The

Electrochemical Society(235th ECS)

3. Cheng-Che Leea , Cheng-Yen Chiena , Wen-I Chenga , Cheng-Wei Yena , Po-Yuan Hub , and Chieh-Hsiung Kuan.(May, 2019) GaN Schottky contact on the Pattern Sapphire Substrate with Reducted threading dislocation. The Electrochemical Society(235th ECS)
4. Chiu-Chang Huang, Hsuan-Han Huang, Bor-Wei Liang, Cheng-Che Lee, Bo-Han Kung, and Chieh-Hsiung Kuan (May, 2019). Well Arranged PDLC Droplets in Grating Structures Inducing the Reduction of Driving Voltage 2019 The Conference on Lasers and Electro-Optics (CLEO 2019).
5. Cheng Yen Chien,Chiu Chang Huang,Chen Kai Yi, Chieh-Hsiung Kuan, and Chia Wei Pai. Growth Mechanism of Gan Growing on Dome-Shaped Patterned-Sapphire Substrates (April, 2019) International Conference on Electronics, Communications and Control Engineering (ICECC 2019)

郭柏齡副教授 Po-Ling Kuo, Associate Professor

學術期刊論文 Journal articles

1. Yu-Chiu Kao, Jhu-Rong Jheng, Huei-Jyuan Pan, Wei-Yu Liao, Chau-Hwang Lee, Po-Ling Kuo," Elevated hydrostatic pressure enhances the motility and enlarges the size of the lung cancer cells through aquaporin upregulation mediated by caveolin-1 and ERK1/2 signaling" , Oncogene, 2017, 36(6):863-874.
2. Po-Ling Kuo, Ching-Che Charng, Po-Chen Wu, Pai-Chi Li, "Shear-wave elasticity measurements of three-dimensional cell cultures for mechanobiology" , Journal of Cell Science, 2017, 130(1):292-302.
3. Chia-Lun Yeh, Po-Ling Kuo, Jean-Luc Gennisson, Javier Brum, Mickaël Tanter, and Pai-Chi Li, "Shear wave measurements for evaluation of tendon diseases" , IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, 2016, 63(11), 1906.

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1. Yu-Chiu Kao, Huei-Jyuan Pan, Chau-Hwang Lee, Po-Ling Kuo, "Caveolin-1 phosphorylation drives elevated hydrostatic pressure-induced invasion of lung cancer cells" , The Biophysical Society thematic meeting on the Mechanobiology of Disease, 2016 Sep, Singapore.

李枝宏特聘教授 Ju-Hong Lee, Distinguished Professor

學術期刊論文 Journal articles

1. Ju-Hong Lee, C.-J. Ciou, and Y.-H. Yang, "Two-dimensional symmetric half-plane recursive doubly complementary digital lattice filters," International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering, Vol. 10, No. 5, pp. 628-634, 2016.
2. Ju-Hong Lee and J.-S. Du, "Phase characteristics for the stability of 2-D quarter-plane recursive digital all-pass filters," IEEE Transactions on Circuits and Systems II, Vol. 63, No. 3, pp. 289-293, March 2016.
3. Ju-Hong Lee and J.-S. Du, "The phase characteristics for the stability of 2-D nonsymmetric half-plane digital allpass filters," IEEE Trans. on Circuits and Systems I, Vol. 63, No. 4, pp. 517-528, April 2016.
4. T.-W. Chiang and Ju-Hong Lee, "Finite SNR diversity-multiplexing tradeoff with spatial correlation and mutual coupling effects for Rayleigh MIMO channels," Journal of the Franklin Institute, Vol. 353, No. 12, pp. 2783-2813, August 2016.
5. T.-W. Chiang and Ju-Hong Lee, "Lower bound for finite-SNR DMT with position estimation errors in MIMO channels," IEEE Communications Letters, Vol. 20, No. 8, pp. 1691-1694, August 2016.
6. T.-W. Chiang and Ju-Hong Lee, "Finite-SNR diversity-multiplexing tradeoff with accurate

performance analysis for fully correlated Rayleigh MIMO channels," IEEE Trans. on Vehicular Technology, Vol. 65, No. 11, pp. 8910-8924, November 2016.

7. Ju-Hong Lee and J.-S. Du, "Lattice structure realization for the design of 2-D digital allpass filters with general causality," IEEE Trans. on Circuits and Systems I, Vol. 64, No. 2, pp. 419-431, February 2017.
8. Ju-Hong Lee and C.-J. Ciou "Design of two-channel quincunx quadrature mirror filter banks using digital all-pass lattice filters," International Journal of Computer, Electrical, Automation, Control and Information Engineering, Vol. 11, No. 5, pp. 446-452, 2017.
9. Y.-F. Wang and Ju-Hong Lee, "A simple phase noise suppression scheme for massive MIMO uplink systems" IEEE Trans. on Vehicular Technology, Vol. 66, No. 6, pp. 4769-4780, June 2017.
10. Ju-Hong Lee and J.-Y. Lee, "Optimal beamforming-selection spatial precoding using population-based stochastic optimization for massive wireless MIMO communication systems," Journal of the Franklin Institute, Vol. 354, No. 10, pp. 4247-4272, July, 2017.

研討會論文 Conference & proceeding papers

1. Y.-F. Wang and Ju-Hong Lee, "A novel symbol-based near ML detection scheme with unequal error protection for MIMO systems," IEEE Wireless Communications and Networking Conference (WCNC), San Francisco, CA, USA, March 19-22, 2017.

李百祺特聘教授 Pai-Chi Li, Distinquished Professor

學術期刊論文 Journal articles

1. Y.-H. Hsu, W.-W. Liu, T.-H. Wu, J.-T. Lee, Y.-H. Chena and P.-C. Li, "Study of Diffusive- and Convective-Transport Mediated Microtumor Growth in a Controlled Microchamber" , Biomedical Microdevices, Vol. 21-7, March, 2019.
2. W.-W. Liu, S.-H. Huang and P.-C. Li, "Synchronized optical and acoustic droplet vaporization for effective sonoporation" , Pharmaceutics, Vol. 11-6, June, 2019.
3. C.-Y. Lee and P.-C. Li, "Automatic Conformal Anti-Radial Ultrasound Scanning for Whole Breast Screening" , Journal of Medical and Biological Engineering, July, 2019.
4. P.-Y. Chao and P.-C. Li, "Laser-speckle-contrast projection tomography for three-dimensional shear wave imaging" , Optics Letters, Vol. 44, Issue 19, pp4809-4812, September, 2019.
5. U-W. Lok, F. -Y. Lin, C. -L. Yeh and P.-C. Li, "Correlation-Based Doppler-Angle Estimation with Plane-Wave Excitation" , Informatics in Medicine Unlocked, Vol. 19, March, 2020.

研討會論文 Conference & proceeding papers

1. P.-C. Li, and C.-Y. Lee, "Improved Decorrelation Based Elevational Motion Estimation with Singular Value Decomposition and Machine Learning" , IEEE International Ultrasonics Symposium (IUS), Kobe, Japan, October 22-25, 2018.
2. W.-W. Liu, S.-H. Chen and P.-C. Li, "Functional calcium imaging using opticalresolution photoacoustic microscopy in a 3D tumor cell culture" , SPIE BiOS, San Francisco, California, United States, February 2-7, 2019.
3. P.-C. Li, "Shear wave elasticity imaging approaches for mechanobiology studies" , plenary speaker, the 9th WACBE World Congress on Bioengineering, Taipei, Taiwan, August 16-19, 2019.
4. P.-C. Li, "Shear Wave Elasticity Imaging for Studying Mechanical Interactions of Cells" , invited talk, the 17th World Federation for Ultrasound in Medicine and Biology Congress, Melbourne, Australia, September 6-9, 2019.
5. P.-C. Li, "Photoacoustic Microscopy for Cells in a 3D Microenvironment: Systems and Applications" , invited talk, the 17th World Federation for Ultrasound in Medicine and Biology Congress, Melbourne, Australia, September 6-9, 2019.
6. P.-C. Li, "Shear wave imaging and photoacoustic imaging of small animals and 3D cell culture systems" , invited

talk, the fall meeting of the Dutch Society for Medical Ultrasound, Delft, Netherlands, October 4, 2019.

7. W.-W. Liu and P.-C. Li, "Ultrasound Modulates Piezo1 Ion Channel Activity" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
8. G.-H. Lai, P.-C. Li and C.-C. Shen "Golay-Encoded Pulse-Inversion Subtraction for RealTime Ultrasound Monitoring of HIFU Therapy" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
9. S. -L. Lu, W. -W Liu, J. C. -H. Cheng, Y. -H. Kuo, C. -R. C. Wang and P.-C. Li, "Radiosensitization in Cancer Treatment with Gold Nanoparticles through Synergistic Sonoporation" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
10. S. -C. Yang, P. -Y. Chao and P.-C. Li, "Single-Transducer Elasticity Measurements Using Reflected Shear Waves" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
11. P. -Y. Chao and P.-C. Li, "Laser Speckle Contrast Based Shear Wave Elasticity Tomography: An Anisotropic Phantom Study" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
12. H. -C. Ko, W. -W. Liu, Y. -H. Kuo, C. -R. C. Wang and P.-C. Li, "Sonoporation based on nanodroplet vaporization" , IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland, UK, October 6-9, 2019.
13. W.-C. Yang, C.-Y. Lin, W.-W. Liu, P.-C. Li and Y.-H. Hsu, "Development of A Microfluidic Platform For Induction of Angiogenesis From A Vascularized Microtissue" , the 23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences(μTAS 2019), Basel, Switzerland, October 27-31, 2019.
14. P.-C. Li, "Ultrasound for preclinical research: Shear wave imaging and photoacoustic imaging of small animals and 3D cell culture systems" , keynote speech, the 5th International Conference on Biomedical Ultrasound, Wuhan, China, November 7-9, 2019.
15. Y.-P. Lai, S.-C. Chen, Y.-S. Yang, C.-L. Yeh and P.-C. Li, "Alterations of Extracellular Matrix Elasticity Stiffness in Three Dimensional Gastric Cancer Invasion Model Measured by High Frequency Shear-Wave Elasticity" , 4th EACR Conference of Goodbye Flat Biology: Advancing 3D-based Models for Cancer Biology and Drug Discovery, Berlin, Germany, November 10-13, 2019.
16. S.-C. Chen, Y.-P. Lai, Y.-T. Ma, Y.-S. Yang, C.-L. Yeh and P.-C. Li, "Stiffness alteration of tumor matrix after tumor killing by CD8+ T cells" , 4th EACR Conference of Goodbye Flat Biology: Advancing 3D-based Models for Cancer Biology and Drug Discovery, Berlin, Germany, November 10-13, 2019.
17. P.-C. Li, "Preclinical research with light and sound: Shear wave imaging and photoacoustic imaging of 3D cell culture systems" , invited talk, the International Symposium of Frontier Acoustics, Shenzhen, China, November 20, 2019.
18. P.-C. Li, "Ultrasound for preclinical research: Shear wave imaging and photoacoustic imaging of small animals and 3D cell culture systems" , plenary talk, the 40th Symposium on Ultrasonic Electronics, Tokyo, Japan, November 25-27, 2019.
19. P.-C. Li, "Synergistic Vaporization for Effective Sonoporation" , invited talk, International Symposium on Medical Ultrasonics, Chiba, Japan, November 28, 2019.

李心予教授 Hsinyu Lee, Professor

學術期刊論文 Journal articles

1. Lee AC, Shih YY, Zhou F, Chao TC, Lee H, Liao YF, Hsu WM and Hong JH. Calreticulin regulates MYCN expression to control neuronal differentiation and stemness of neuroblastoma. Journal of Molecular Medicine. 97(3): 323-339. Mar, 2019. doi: 10.1007/s00109-018-1730-x. [Epub ahead of print]
2. Hsia K, CH Lin, Lee H, Chen WM, CL Yao, Chen CC, MA H, Wang SJ and Lu JH. S1P in endothelial cell recellularization improves patency and endothelialization of decellularized vascular grafts in vivo. Int J Mol Sci. 20(7):1641. doi: 10.3390/ijms20071641. April 2, 2019. (as equal first author)
3. Lee CF, A Dang, E Hernandez, RC Pong, B Chen, R Sonavane, G Raj, P Kapur, HY Lin, SR Wu, CJ Ko, UG Lo, H Lee, JT Hsieh and MS Lee. Activation of sphingosine kinase by lipopolysaccharide promotes prostate cancer cell invation and metastasis via SphK1/S1PR4/matripase. Oncogene. 38(28): 5580-5598. Doi: org/10/1038/s41388-019-0833-3. July 2019.
4. Kuo CT, Wang JY, Lu SR, Lai YS, Chang HH, Hsieh JT, Wo AM, Chen BPC, Lu JH, Lee H*. A nanodroplet cell processing platform facilitating drug synergy evaluations for anti-cancer treatments. Scientific Reports. 9(1): 10120. July 12, 2019.
5. Lu JK, Tsai TC, Lee H, Hsia K, Lin CH, Lu JH. Pectoral fin anomalies in tbx5a knockdown zebrafish embryos related to the cascade effect of n-cadherin and extracellular matrix formation. J Dev Biol. 7(3). pii: E15. doi: 10.3390/jdb7030015. July 12, 2019.
6. Wu PY, Chuang PY, Chang GD, Chan YY, Tsai TC, Wang BJ, Lin KH, Hsu WM*, Liao YF* and Lee H*. Novel endogenous ligands of aryl hydrocarbon receptor mediate neural development and differentiation of neuroblastoma. ACS Chem Neurosci. 10(9): 4031-4042. Doi: 10.1021/acschemneuro.9b00273. Sep 18th, 2019.
7. Wu PY, Yu IS, Lin YC, Chang YT, Chen CC, Lin KH, Tseng TH, Kargren M, Tai YL, Shen TL, Liu YL, Wang BJ, Chang CH, Chen WM, Juan HF, Huang SF, Chan YY, Liao YF*, Hsu WM* and Lee H*. Activation of Aryl Hydrocarbon Receptor by Kynurenine Impairs Progression and Metastasis of Neuroblastoma. Cancer Res. 79 (21): 5550-5562. Doi: 10.1158/0008-5472.CAN-18-3272. Nov 1st, 2019.
8. Lin CH, Lu JH, Hsia K, Lee H, Yao CL and Ma H. The antithrombotic function of S1P on human adipose stem cell recellularized tissue engineered vascular graft in vitro. Int J Mol Sci. 20(20): 5218. doi: 10.3390/ijms20205218. Oct 21st, 2019.
9. Chen WM, Chiang JC, Lin YC, Lin YN, Chuang PY, Chang YC, Chen CC, Wu KY, Hsieh JC, Chen SK, Huang WP, Chen BPC* and Lee H*. Lysophosphatidic acid receptor LPA3 prevents oxidative stress and cellular senescence in Hutchinson–Gilford progeria syndrome. Aging Cell. Jan 2020;19(1):e13064.
10. Lee PC, Chiang JC, Chen CY, Chien YC, Chen WM, Huang CW, Weng WC, Chen CI, Lee PH, Chen CN, Lee H*. Calreticulin regulates vascular endothelial growth factor-A mRNA stability in gastric cancer cells. PLoS One. 14(11): e0225107. doi: 10.1371/journal.pone.0225107. eCollection. Nov 14, 2019.
11. Lin KH, Chiang JC, Ho YH, Yao CL and Lee H*. Lysophosphatidic acid and hematopoiesis: From microenvironmental effects to intracellular signaling. Int J Mol Sci. 20(21): 2015. doi: 10.3390/ijms21062015. Mar 16th, 2020.
12. Lin YN, Audira G, Malhotra N, Anh, NTN, Siregа P, Lu JH, Lee H* and Hsiao CD*. A novel function of the lysophosphatidic acid receptor 3 gene in zebrafish on modulating anxiety, circadian rhythm locomotor activity, and short-term memory. Int J Mol Sci. 20(21): 2837. doi: 10.3390/ijms21082837. April 18th, 2020.

研討會論文 Conference & proceeding papers

1. WM Chen, YC Chang, YN Lin, JC Chiang, H Lee. Histological Analysis of Lysophosphatidic Acid Receptor 3 Deficient Zebrafish. EB 2019: 705.5, Orlando, USA, 2019.
2. JC Chiang, KH Lin, WM Chen, H Lee. Lysophosphatidic Acid Regulates Erythropoiesis at Different Hematopoietic Hierarchy. EB 2019: 705.4, Orlando, USA, 2019.

林致廷教授 Chih-Ting Lin, Professor

學術期刊論文 Journal articles

1. W.-Y. Chuang, C.-C. Wu, Y.-C. Su, H.-H. Chen, H.-W. Chiu, S.-S. Lu, and C.-T. Lin*, "A low-power PEDOT:PSS/EB-PANI for CO2 sensing material integrated with a self-powered sensing platform," IEEE Sensors, 2020, 20, 55-61, DOI: 10.1109/JSEN.2019.2941655.
2. Y.-P. Lu, J.-W. Huang, I.-N. Lee, R.-C. Weng, M.-Y. Lin, J.-T. Yang, and C.-T. Lin*, "A portable system to monitor saliva conductivity for dehydration diagnosis and kidney healthcare," Scientific Report, 2019, 9, 14771, DOI: 10.1038/s41598-019-51463-8.
3. P.-W. Yen, S.-C. Lin, Y.-C. Huang, Y.-J. Huang, Y.-C. Tung, S.-S. Lu, and C.-T. Lin*, "A low-power CMOS microfluidic pump based on travelling-wave electroosmosis for diluted serum pumping," Scientific Report, 2019, 9, 14794, DOI: 10.1038/s41598-019-51464-7.
4. C.-H. Tseng, C. Lin, H.-C. Chang, C.-C. Liu, B. Serafico, L.-C. Wu, C.-T. Lin, T. Hsu, C.-Y. Huang, and M.-T. Lo, "Cloud-based artificial intelligence system for large-scale arrhythmia screening," IEEE Computers, 2019, 52, 40-51, DOI: 10.1109/MC.2019.2933195.
5. C.-H. Lin, W.-T. Chen, C.-H. Huang, W.-Y. Woon, C.-T. Lin*, "Effects of μ-electron in humidity sensing of artificially stacked graphene bilayers modified with carboxyl and hydroxyl groups," Sensors and Actuators B-Chemical, 2019, 301, 127020, DOI: 10.1016/j.snb.2019.127020.
6. W.-E. Hsu, Y.-H. Chang, C.-T. Lin*, "A Machine-Learning Assisted Sensor for Chemo-Physical Dual Sensing Based on Io-Sensitive Field-Effect Transistor Architecture," IEEE Sensors, 2019, 19(21), 9983-9990, DOI: 10.1109/JSEN.2019.2927038.
7. C.-H. Lin, M.-S. Tsai, W.-T. Chen, Y.-Z. Hong, P.-Y. Chien, C.-H. Huang, W.-Y. Woon, C.-T. Lin*, "A Low-Damage Plasma Surface Modification Method of Stacked Graphene Bilayers for Configurable Wettability and Electrical Properties," Nanotechnology, 2019, 30(24), 245709, DOI: 10.1088/1361-6528/ab0511.

林啟萬教授 Chii-Wann Lin, Professor

學術期刊論文 Journal articles

1. C.Wang, M.-C. Ko,Y.-M. Chen, L.-Q. Chen,C.-W. Lin, "An automatic multi-thread image segmentation embedded system for surface plasmon resonance sensor" , Sensors and Actuators A 285(2019)603–612
2. Z. Xu, Y. Luo, T. Soteyome, C.-W. Lin, X. Xu, Y. Mao, J. Su, J. Liu, "Rapid Detection of Food-Borne Escherichia coli O157:H7 with Visual Inspection by Crossing Priming Amplification (CPA)" , Food Analytical Methods, (2019), https://doi.org/10.1007/s12161-019-01651-
3. C.-C. Chang*, C.-P. Chen, T.-H. Wu, C.-H. Yang, C.-W. Lin, C.-Y. Chen, "Gold Nanoparticle-Based Colorimetric Strategies for Chemical and Biological Sensing Applications" , Nanomaterials (2019), 9, 861; doi:10.3390/nano9060861
4. T.-H. Wu, C.-C. Chang, C.-H. Yang, W.-Y. Lin, T. J. Ee, C.W. Lin, "Hybridization Chain Reactions Targeting the Severe Acute Respiratory Syndrome Coronavirus 2(SARS-CoV-2)" , Int. J. Mol. Sci. (2020), 21, 3216; doi:10.3390/ijms21093216

研討會論文 Conference & proceeding papers

1. C. Wang,, , L.-Q. Chen, , Y.-M. Chen, , C.-W. Lin, "Hot electron based surface plasmon resonance sensor with Au-TiO2-Ti planar micro comb-structure Schottky diodes" , Proc. SPIE 10894, Plasmonics in Biology and Medicine XVI, 1089419 (7 March 2019); doi: 10.1117/12.2505218

孫啟光特聘教授 Chi-Kuang Sun , Distinguished Professor

學術期刊論文 Journal articles

1. S. Chakraborty, S.-Y. Lee, J.-C. Lee, C.-T. Yen, and C.-K. Sun, "Saturated two-photon excitation fluorescence microscopy for the visualization of cerebral neural networks at millimeters deep depth," Journal of Biophotonics 12 (1), e201800136 (2019). Issue Back Cover
2. J.-H. Lee, Y.-T. Shih, M.-L. Wei, C.-K. Sun, and B.-L. Chiang "Classification of Established Atopic Dermatitis in Children with the In Vivo Imaging Methods," Journal of Biophotonics 12 (5), e201800148 (2019).
3. C.-K. Sun, C.-T. Kao, M.-L. Wei, S.-H. Chia, F. X. Kärtner, A. Ivanov, and Y.-H. Liao, "Slide-free imaging of hematoxylin-eosin stained whole-mount tissues using combined third-harmonic generation and three-photon fluorescence microscopy," Journal of Biophotonics 12 (5), e201800341 (2019). Inside Front Cover
4. T.-H. Chou, L. Lindsay, A. A. Maznev, J. S. Gandhi, D. W. Stokes, R. L. Forrest, A. Bensaoula, K. A. Nelson, and C.-K. Sun, "Long mean free paths of room-temperature THz acoustic phonons in a high thermal conductivity material," Physical Review B 100 (9), 094302 (2019).
5. C.-K. Sun, W.-M. Liu, and Y.-H. Liao, "Study on melanin enhanced third harmonic generation in a live cell model," Biomedical Optics Express 10 (11), pp. 5716-5723 (2019).
6. Y.-H. Liao, Y.-H. Su, Y.-T. Shih, W.-S. Chen, S.-H. Jee, and C.-K. Sun, "In vivo third harmonic generation microscopy study on vitiligo patients," Journal of Biomedical Optics 25 (1), 014504 (2020). Cover
7. K.-H. Lin, Y.-H. Liao, M.-L. Wei, and C.-K. Sun, "Comparative analysis of intrinsic skin aging between Caucasian and Asian subjects by slide-free in vivo harmonic generation microscopy," Journal of Biophotonics 13 (4), e201960063 (2020). Inside Cover
8. S. Chakraborty, S.-T. Chen, Y.-T. Hsiao, M.-J. Chiu, and C.-K. Sun, "Additive-color multi-harmonic generation microscopy for simultaneous label-free differentiation of plaques, tangles, and neuronal axons," Biomedical Optics Express 11 (2), pp. 571-585 (2020).
9. C.-K. Sun, Y.-T. Yao, C.-C. Shen, M.-H. Ho, T.-C. Lu, and J.-K. Sheu, "Observation of femtosecond acoustic anomaly in a solid liquid interface," The Journal of Physical Chemistry C 124 (5), pp. 2987-2993 (2020).
10. C.-K. Sun, P.-C. Wu, S.-T. Chen, Y.-H. Su, M.-L. Wei, C.-Y. Wang, H.-C. Gao, K.-B. Sung, Y.-H. Liao, "Slide-free clinical imaging of melanin with absolute quantities using label-free third-harmonic-generation enhancement-ratio microscopy," Biomedical Optics Express 11 (6), pp. 3009-3024 (2020).

研討會論文 Conference & proceeding papers

1. C.-K. Sun, "Noninvasive histopathological imaging by using label-free harmonic generation microscopy," International Workshop on BioImaging (IWBI2019), paper 18-10, Utsunomiya, Japan (2019). Invited Speaker
2. M. Foret; A. Huynh; E. Peronne; J. Sheu; T. Hung; B. Perrin; B. Ruffle; R. Vacher; C.-K. Sun, "High-frequency acoustic modes in vitreous silica via ultrafast optical techniques," The 25th International Congress on Glass (ICG 2019), paper ICG-SII-220-2019, Boston MA (2019). Invited Talk.
3. C.-K. Sun, C.-T. Kao, Y.-H. Liao, and M.-L. Wei, "Rapid intraoperative margin assessment by using multi-modal third-harmonic generation and three-photon fluorescence microscopy," in Preclinical and Clinical Optical Diagnosis, European Conferences on Biomedical Optics, paper 11073-32, Munich, Germany (2019); SPIE Proceedings 11073, Clinical and Preclinical Optical Diagnostics II, 110730X (2019); http://dx.doi.org/10.1117/12.2525658
4. C.-K. Sun, C.-T. Kao, M.-L. Wei, and Y.-H. Liao, "Slide-free histopathological imaging of hematoxylin-eosin-stained whole mount tissues using Cr:forsterite laser based nonlinear microscopy," SPIE Optics and Optoelectronics, paper 11026-29, Prague, Czech Republic (2019).
5. C.-K. Sun, C.-T. Kao, Y.-H. Liao, and M.-L. Wei, "Slide-free histopathological imaging of hematoxylin-eosin-stained whole mount tissues for rapid intraoperative margin assessment," The 9th WACBE World Congress on Bioengineering (WACBE 2019), Taipei, Taiwan (2019). Keynote Speaker
6. C.-K. Sun and T.-C. Hung, "Boson peak and room temperature sound attenuation in vitreous silica in the 1 THz frequency range," in Abstract Book of 2019 International Congress on Ultrasonics, pp. 378, Bruges, Belgium (2019).

7. C.-K. Sun, "Revealing the ultralong mean free paths of room-temperature phonons by using THz acoustics," in Proceedings of The 5th International Symposium on Microwave/Terahertz Science and Applications (MTSA2019), paper Tu-P4-m-1, Busan, Korea (2019). Invited Speaker
8. C.-K. Sun, Y. Pan, P.-C. Wu, S.-T. Chen, and Y.-H. Liao, "Clinical applicability of in vivo harmonic generation microscopy for the diagnosis and grading of actinic keratosis," in Photonics in Dermatology and Plastic Surgery 2020, paper 11211-5, Photonics West, San Francisco, CA (2020).
9. C.-K. Sun, K.-H. Lin, M.-L. Wei, and Y.-H. Liao, "Studying intrinsic skin aging by slide-free in vivo harmonic generation microscopy," in Multiphoton Microscopy in the Biomedical Sciences XX, paper 11244-36, Photonics West, San Francisco, CA (2020). Invited Speaker
10. C.-K. Sun and Y.-H. Liao, "Quantitative melanin imaging using label-free third-harmonic-generation enhancement-ratio microscopy," in Label-free Biomedical Imaging and Sensing (LBIS) 2020, paper 11251-11, Photonics West, San Francisco, CA (2020). Invited Speaker
11. S. Chakraborty, P.-C. Wu, S.-T. Chen, M.-J. Chiu, and C.-K. Sun, "Assessment of neuropathology of Alzheimer's disease brain with high-resolution, label-free multi-harmonic generation microscopy," in Label-free Biomedical Imaging and Sensing (LBIS) 2020, paper 11251-13, Photonics West, San Francisco, CA (2020).
12. B. J. Borah, H.-H. Chi, C.-T. Yen, and C.-K. Sun, "Super-speed multiphoton microscopy for mesoscopic volume imaging with ultra-dense sampling beyond Nyquist Limit," in Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVII, paper 11245-38, Photonics West, San Francisco, CA (2020).

宋孔彬副教授 Kung-Bin Sung, Associate Professor

學術期刊論文 Journal articles

1. Chi-Kuang Sun, Pei-Jhe Wu, Sheng-Tse Chen, Yu-Hsiang Su, Ming-Liang Wei, Chiao-Yi Wang, Hao-Cheng Gao, Kung-Bing Sung, and Yi-Hua Liao (2020, May). Slide-free clinical imaging of melanin with absolute quantities using labelfree third-harmonic-generation enhancement-ratio microscopy. Biomedical Optics Express, 11(6), 3009-3024.
2. Chao-Mao Hsieh, Patricia Yang Liu, Lip Ket Chin, Jing Bo Zhang, Kuan Wang, Kung-Bing Sung, Wee Ser, Tarik Bourouina, Yamin Leprince-Wang, Ai-Qun Liu (2019, Aug). Regulation of lipid droplets in live preadipocytes using optical diffraction tomography and Raman spectroscopy. Optics Express, 27(16), 22994-23008.
3. Chiao-Yi Wang, Tzu-Chia Kao, Yin-Fu Chen, Wen-Wei Su, Hsin-Jou Shen, Kung-Bing Sung (2019, May). Validation of an Inverse Fitting Method of Diffuse Reflectance Spectroscopy to Quantify Multi-Layered Skin Optical Properties. Photonics, 6(2), 61. MOST 105-2221-E-002-068-MY3. 本人為通訊作者.
4. Hong-Po Hsieh, Fan-Hua Ko, Kung-Bing Sung (2018, Apr). Hybrid method to estimate two-layered superficial tissue optical properties from simulated data of diffuse reflectance spectroscopy. Applied Optics, 57(12), 3038-3046. MOST 105-2221-E-002-068-MY3. 本人為通訊作者.
5. Sheng-Yang Tsui, Chiao-Yi Wang, Tsan-Hsueh Huang, Kung-Bing Sung (2018, Apr). Modeling spatially-resolved diffuse reflectance spectra of a multi-layered skin model by artificial neural networks trained with Monte Carlo simulations. Biomedical Optics Express, 9(4), 1531-1544. MOST 105-2221-E-002-068-MY3. 本人為通訊作者.
6. Yang-Hsien Lin, Shin-Shyang Huang, Shang-Ju Wu, Kung-Bing Sung (2017, Nov). Morphometric analysis of erythrocytes from patients with thalassemia using tomographic diffractive microscopy. Journal of Biomedical Optics, 22(11), 116009. MOST 102-2221-E-002-032-MY3. 本人為通訊作者.

研討會論文 Conference & proceeding papers

1. A.Y. Liao, Y.M. Lai, K.B. Sung (2020, Apr). Simulation Investigation of the Spatial Arrangement of Optodes in Functional Near Infrared Spectroscopy. OSA Biophotonics Congress: Biomedical Optics. MOST 108-2221-E-002-075-MY3. 本人為通訊作者.

2. C.I. Mok, K.B. Sung (2020, Apr). Extracting Autofluorescence Spectral Shape and Intensity from Uterine Cervical Mucosa Using Monte-Carlo Based Twolayered Tissue Models. OSA Biophotonics Congress: Biomedical Optics 2020. 本人為通訊作者.

3. Kung-Bin Sung, Tzu-Chia Kao, Chao-Shun Zhan, Ting-Xuan Lin (2019, Apr). Comparison of Photon Energy Distributions in the Prefrontal Cortex between 810 nm and 1064 nm for Optimizing Photobiomodulation Effects. OSA Biophotonics Congress: Optics in the Life Sciences, Tucson, AZ, USA. 本人為第一作者、通訊作者.

4. C.Y. Wang, T.X. Lin, K.B. Sung (2018, Sep). Improved Inverse Two-Layered Monte Carlo Fitting of In-vivo Skin Diffuse Reflectance Spectra. Frontiers in Optics 2018, Washington, D.C., USA. 本人為通訊作者.

5. S.C. Tu, K.B. Sung (2018, Sep). Extracting fluorescence efficiency and emission spectra of cervical tissue. Frontiers in Optics 2018, Washington, D.C. United States.

6. Chiao-Yi Wang, Andy Ying-Chi Liao, Kung-Bin Sung (2018, Feb). Developing Visible and Near-Infrared Reflectance Spectroscopy to Detect Changes of the Dermal Collagen Concentration. SPIE Photonics West, San Francisco, USA. 本人為通訊作者. 收錄於Proceedings of SPIE Vol. 10489, 1048915..

7. Chiao-Yi Wang, Ting-Wen Yu, Kung-Bin Sung (2018, Feb). In vivo Measurements of Optical Properties of Human Muscles with Visible and Near Infrared Reflectance Spectroscopy. SPIE Photonics West, San Francisco, USA. MOST 105-2221-E-002-068-MY3. 本人為通訊作者. 收錄於Proceedings of SPIE Vol. 10489, 104890F.

楊泮池特聘教授 Pan-Chyr Yang, Distinguished Professor

學術期刊論文 Journal articles

8. Hung PF, Hong TM, Chang CC, Hung CL, Hsu YL, Chang YL, Wu CT, Chang GC, Chan NL, Yu SL, Yang PC, Pan SH Hypoxia-induced Slug SUMOylation enhances lung cancer metastasis. Journal of experimental & clinical cancer research : CR 38(1), 5 (2019)

9. Tseng SJ, Kempson IM, Huang KY, Li HJ, Fa YC, Ho YC, Liao ZX, Yang PC Targeting Tumor Microenvironment by Bioreduction-Activated Nanoparticles for Light-Triggered Virotherapy. ACS nano 12(10), 9894-9902 (2018)

10. Huang BT, Lai WY, Chang YC, Wang JW, Yeh SD, Lin EP, Yang PC A CTLA-4 Antagonizing DNA Aptamer with Antitumor Effect. Molecular Therapy-Nucleic Acids 8, 520-528 (2017)

11. Lin CW, Wang LK, Wang SP, Chang YL, Wu YY, Chen HY, Hsiao TH, Lai WY, Lu HH, Chang YH, Yang SC, Lin MW, Chen CY, Hong TM, Yang PC Corrigendum: Daxx inhibits hypoxia-induced lung cancer cell metastasis by suppressing the HIF-1alpha/HDAC1/Slug axis. Nature communications 8, 14502 (2017)

12. Kao SH, Wang WL, Chen CY, Chang YL, Wu YY, Wang YT, Wang SP, Nesvizhskii AI, Chen YJ, Hong TM, Yang PC GSK3beta controls epithelial-mesenchymal transition and tumor metastasis by CHIP-mediated degradation of Slug. Oncogene 36(42), 5916 (2017)

13. Wang YT, Pan SH, Tsai CF, Kuo TC, Hsu YL, Yen HY, Choong WK, Wu HY, Liao YC, Hong TM, Sung TY, Yang PC, Chen YJ Phosphoproteomics Reveals HMGA1, a CK2 Substrate, as a Drug-Resistant Target in Non-Small Cell Lung Cancer. Scientific reports 7, 44021 (2017)

楊東霖助理教授 T. Tony Yang, Assistant Professor

學術期刊論文 Journal articles

1. Chong, W. M., Wang, W. J., Lo, C. H., Chiu, T. Y., Chang, T. J., Liu, Y. P., Tanos, B., Mazo, G., Tsou, M.-F. B., Jane, W.-N., Yang, T.T.*, Liao, J.-C.* (2020). Super-resolution microscopy reveals coupling between mammalian centriole subdistal appendages and distal appendages. Elife, 9, e53580. (*corresponding authors) (SCI, Impact Factor: 7.551)

2. Lo, C.-H., Lin, I.-H., Yang, T.T., Huang, Y.-C., Tanos, B.E., Chou, P.-C., Chang, C.-W., Tsay, Y.-G., Liao, J.-C., Wang, W.-J. (2019) Phosphorylation of CEP83 by TTBK2 is necessary for cilia initiation, Journal of Cell Biology, 218(10), 3489. (Fields: Cell biology: 23/193, SCI, Impact Factor: 8.891)
3. Yang, T.T., Tran T.M.N., Chong, W.M., Liao, J.-C. (2019) Single-particle tracking localization microscopy reveals nonaxonemal dynamics of intraflagellar transport proteins at the base of mammalian primary cilia, Molecular Biology of the Cell, 30, 828-837. (Fields: Cell biology: 82/193, SCI, Impact Factor: 3.905)
4. Chu, S.-H., Lo, L.-L., Lai, R.L., Yang, T.T., Liao, J.-C., Huang, N.-T. (2019) A microfluidic device for in situ fixation and super-resolved mechanosensation studies of primary cilia, Biomicrofluidics, 13, 014105. (Fields: Biomedical research methods: 36/79, SCI, Impact Factor: 2.531)

研討會論文 Conference & proceeding papers

1. Wang, J., Liao, J. C., & Yang, T. T. (2020). Single-molecule tracking reveals varying transport speed of IFT88 proteins at the base of mammalian primary cilia. Biomedical Imaging and Sensing Conference (Vol. 11521, p. 1152104). International Society for Optics and Photonics.
2. Chong, W. M., Yang, T. T., & Liao, J. C. (2019). Super-Resolution Microscopy Reveals the Molecular Architecture of Centriole Subdistal Appendages and Its Role in Microtubule/Golgi Anchoring. Biophysical Journal, 116(3), 133a.

周迺寬副教授 Nai-Kuan Chou, Clinical Associate Professor

學術期刊論文 Journal articles

1. Chou YH, Huang TM, Wu VC, Chen WS, Wang CH, Chou NK, Chiang WC, Chu TS, Lin SL; National Taiwan University Study Group on Acute Renal Failure (NSARF). Associations between preoperative continuation of renin-angiotensin system inhibitor and cardiac surgery-associated acute kidney injury: a propensity score-matching analysis. J Nephrol. 2019 Dec;32(6):957-966.
2. Chang WT, Wang CH, Lai CH, Yu HY, Chou NK, Wang CH, Huang SC, Tsai PR, Chou FJ, Tsai MS, Huang CH, Ko WJ, Chen WJ, Chen YS. Optimal Arterial Blood Oxygen Tension in the Early Postresuscitation Phase of Extracorporeal Cardiopulmonary Resuscitation: A 15-Year Retrospective Observational Study. Crit Care Med. 2019 Nov;47(11):1549-1556.
3. Okano R, Liou YJ, Yu HY, Wu IH, Chou NK, Chen YS, Chi NH. Coronary Artery Bypass in Young Patients-On or Off-Pump? J Clin Med. 2019 Jan 22;8(2). pii: E128. doi: 10.3390/jcm8020128.
4. Yu HY, Wang CH, Chi NH, Huang SC, Chou HW, Chou NK, Chen YS. Effect of interplay between age and low-flow duration on neurologic outcomes of extracorporeal cardiopulmonary resuscitation. Intensive Care Med. 2019 Jan;45(1):44-54.
5. Huang KC, Wu IH, Chou NK, Yang YY, Lin LC, Yu HY, Chi NH. Late outcomes of off-pump versus on-pump coronary bypass in patients with diabetes: A nationwide study from Taiwan. J Thorac Cardiovasc Surg. 2019, March :157(3); 960-969.e2

魏安祺助理教授 An-Chi Wei, Assistant Professor

學術期刊論文 Journal articles

1. Klitos Konstantinidis, Vassilios Bezzerides, Lo Lai, Holly Isbell, An-Chi Wei, Yuejin Wu, Meera Viswanathan, Ian Blum, Jonathan Granger, Donghui Zhang, Danielle Heims-Waldron, Elizabeth Luczak, Kevin Murphy, ..., Anthony Cammarato, Mario Bianchet, Madeline Shea, Rodney L. Levine, Mark E. Anderson MICAL1 operates a stereospecific sulfoxidation switch constraining CaMKII activation. Journal of Clinical Investigation, Accepted

2. Md Habibur Rahman, Qinru Xiao, Shirui Zhao, Fuyang Qu, Chen Chang, An-Chi Wei and Yi-Ping Ho*. Demarcating the membrane damage for the extraction of functional mitochondria. Microsystems & Nanoengineering, 2018, 4

研討會論文 Conference & proceeding papers

1. Shao-Ting Chiu, An-Chi Wei. "Understanding the System Dynamics of Mitochondrial Retrograde Signaling from a Differential Equation-based Framework" The 20th International Conference on Systems Biology, Nov 2019, Okinawa, Japan
2. Chan-Min Hsu, Shao-Ting Chiu, Zih-Hua Chen, Ko-Hong Lin, An-Chi Wei. "Subcellular mitochondria structure prediction in label-free microscopy images using convolutional neural networks" The 20th International Conference on Systems Biology, Nov 2019, Okinawa, Japan
3. Ko-Hong Lin, Wen-Wei Tseng, Yu-De Lin, Zih-Hua Chen, An-Chi Wei. "MiToxdb: A comprehensive database of drug- and chemical-induced mitochondrial toxicity" The 9th WACBE World Congress on Bioengineering (WACBE 2019), Aug 2019, Taipei, Taiwan.
4. Chen Chang, Yinghua Ye, Qinru Xiao, Yi-Ping Ho, An-Chi Wei. "In Silico Simulation of Metabolic Regulation on Mitochondrial Dynamics in Ageing" The 9th WACBE World Congress on Bioengineering (WACBE 2019), Aug 2019, Taipei, Taiwan.

張瑞峰教授 Ruey-Feng Chang , Professor

學術期刊論文 Journal articles

1. Moon WK, Lee YW, Ke HH, Lee SH, Huang CS, Chang RF*, 2020.07, "Computer-aided diagnosis of breast ultrasound images using ensemble learning from convolutional neural networks," Computer Methods and Programs in Biomedicine, vol. 190, 105361.
2. Moon WK, Huang YS, Hsu CH, Chang Chien TY, Chang JM, Lee SH, Huang CS, Chang RF*, 2020.07, "Computer-aided tumor detection in automated breast ultrasound using a 3-D convolutional neural network," Computer Methods and Programs in Biomedicine, vol. 190, 105360.
3. Wang YW, Chang RF, Horng YS, Chen CJ, 2020.03, "MNT-DeepSL: Median nerve tracking from carpal tunnel ultrasound images with deep similarity learning and analysis on continuous wrist motions," Computerized Medical Imaging and Graphics, vol. 80, 101687.
4. Chen CM, Huang YS, Fang PW, Liang CW*, Chang RF*, 2020.03, "A computer-aided diagnosis system for differentiation and delineation of malignant regions on whole-slide prostate histopathology image using spatial statistics and multidimensional DenseNet," Medical Physics, vol. 47, no. 3, pp. 1021-1033.
5. Moon WK, Chen HH, Shin SU, Han W, Chang RF*, 2019.11, "Evaluation of TP53/PIK3CA mutations using texture and morphology analysis on breast MRI," Magnetic Resonance Imaging, vol. 63, pp. 60-69. doi: 10.1016/j.mri.2019.08.026
6. Liaw CK, Chen YP, Wu TY, Fuh CS, Chang RF, 2019.10, "New computerized method in measuring the sagittal bowing of femur from plain radiograph-A validation study," Journal of Clinical Medicine, vol. 8, no. 10, 1598.
7. Chen JH, Chan S, Zhang Y, Li S, Chang RF, Su MY, 2019.09, "Evaluation of breast stiffness measured by ultrasound and breast density measured by MRI using a prone-supine deformation model," Biomarker Research, 7:20.
8. Chen CH, Lee YW, Huang YS, Lan WR, Chang RF, Tu CY, Chen CY, Liao WC, 2019.08, "Computer-aided diagnosis of endobronchial ultrasound images using convolutional neural network," Computer Methods and Programs in Biomedicine, vol. 177, pp. 175-182. doi: 10.1016/j.cmpb.2019.05.020
9. Chan SW, Chang YC, Huang PW, Ouyang YC, Chang YT, Chang RF, Chai JW, Chen CC, Chen HM, Chang CI, Lin CY, 2019.07, "Breast Tumor Detection and Classification Using Intravoxel Incoherent Motion Hyperspectral Imaging Techniques," BioMed Research International, 2019:3843295. doi: 10.1155/2019/3843295

10. Chang RF, Lee CC, Lo CM, 2019.02, "Quantitative diagnosis of rotator cuff tears based on sonographic pattern recognition," PLoS One, vol. 14, no. 2, e0212741.
11. Chiang TC, Huang YS, Chen RT, Huang CS, Chang RF*, 2019.01, "Tumor detection in automated breast ultrasound using 3-D CNN and prioritized candidate aggregation," IEEE Transactions on Medical Imaging, vol. 38, no. 1, pp. 240-249.

研討會論文 Conference & proceeding papers

1. Chang RF, Ho YH, Huang YS, Chang Chien TY, Xiang HL, Lin X, 2020.06, "One-stage Tumor Detection for Automated Breast Ultrasound Using Deep Convolutional Network, " CARS 2020 Computer Assisted Radiology and Surgery, Proceedings of the 34th International Congress and Exhibition, Munich, Germany, June 23-27, 2020.
2. Huang YS, Chang Chien TY, Lee CH, Lin X, Xiang H, Chang RF, 2020.06 "3D Capsule Neural Network on Automated Breast Ultrasound Tumor Diagnosis " CARS 2020 Computer Assisted Radiology and Surgery, Proceedings of the 34th International Congress and Exhibition, Munich, Germany, June 23-27, 2020.
3. Chang RF, 2020.01, "Breast Ultrasound Computer-aided Diagnosis Using Deep Learning," International Workshop on Advanced Image Technology 2020 (IWAIT 2020), Yogyakarta, Indonesia, Jan. 5-7, 2020. (Invited Talk)
4. Chang RF, 2019.11, "Automated Breast Ultrasound Computer-aided Detection and Diagnosis Using Deep Learning," 2019 AI創新研究專案國際研討會暨聯合成果展, 交通大學博愛校區賢齊館, Hsinchu, Taiwan, Nov. 14-15, 2019. (Invited Talk)
5. Chang RF, 2019.10, "Medical image AI and Deep Learning," AI in Medical Imaging, 臺大醫院國際會議廳, Taipei, Taiwan, Oct. 26, 2019. (Invited Talk)
6. Chang RF, 2019.10, "Medical image AI and Deep Learning," AI in Medical Imaging, 彰化基督教醫院連瑪玉學術講堂, Taipei, Taiwan, Oct. 25, 2019. (Invited Talk)
7. Chang RF, 2019.10, "Breast ultrasound computer-aided diagnosis using deep learning," 第一屆亞太醫用超音波新進展國際論壇暨中華民國醫用超音波學會2019年會暨第二次學術研討會, 林口長庚醫院研究大樓會議中心, New Taipei City, Taiwan, Oct. 19-20, 2019. (Invited Talk)
8. Chang RF, 2019.09, "醫學影像與人工智慧," 台灣人工智慧學校, 中央研究院人文館3樓國際會議廳, Taipei, Taiwan, Sep. 7, 2019. (Invited Talk)
9. Chang RF, 2019.09, "醫學影像與人工智慧," 大數據與人工智慧(AI)時代的智慧醫療應用, 台灣雲端物聯網產業協會, Taipei, Taiwan, Sep. 4, 2019. (Invited Talk)
10. Chang RF, Huang YS, Hsu CH, 2019.06, "Tumor detection for automated breast ultrasound using 3-D convolutional neural network," CARS 2019 Computer Assisted Radiology and Surgery, Proceedings of the 33th International Congress and Exhibition, Rennes, France, June 18-21, 2019, vol. 14, supp. 1, p. S83.
11. Chang RF, Huang YS, Chiang TC, Peng HY, Huang CS, 2019.01, "Automated breast ultrasound computer-aided diagnosis using 3-D convolutional neural network," The 2019 Joint International Workshop on Advanced Image Technology (IWAIT) and International Forum on Medical Imaging in Asia (IFMIA), Singapore, paper no. 137.
12. Huang YS, Chang RF, Hong JK, Chang YC, 2019.01, "Lung CT computer-aided diagnosis using multi-scale densely connected network," The 2019 Joint International Workshop on Advanced Image Technology (IWAIT) and International Forum on Medical Imaging in Asia (IFMIA), Singapore, paper no. 24.
13. Lee CC, Lo CM, Chang RF, 2019.01, "Quantitative diagnosis of rotator cuff ruptures using sonographic pattern recognition system," The 2019 Joint International Workshop on Advanced

Image Technology (IWAIT) and International Forum on Medical Imaging in Asia (IFMIA), Singapore, paper no. 160.

14. Lee YW, Ke HH, Chang RF, 2019.01, "Computer-aided diagnosis of breast cancer using ensemble convolutional neural networks," The 2019 Joint International Workshop on Advanced Image Technology (IWAIT) and International Forum on Medical Imaging in Asia (IFMIA), Singapore, paper no. 58.

專書 Book Chapters

1. Lo CM and Chang RF, 2018.01, "Intelligent Diagnosis of Breast Cancer Based on Quantitative B-Mode and Elastography Features," Invited Chapter, Artificial Intelligence in Decision Support Systems for Diagnosis in Medical Imaging, edited by Suzuki K, Chen Y, Springer, pp. 165-191.

趙坤茂教授 Kun-Mao Chao, Professor

學術期刊論文 Journal articles

1. H Ho, B.-S., and Chao, K.-M., 2020, "On the influenza vaccination policy through mathematical modeling," International Journal of Infectious Diseases, accepted..

專書 Book Chapters

1. 趙坤茂, 張雅惠, 黃寶萱 (2004年初版；2017年修訂第十二版)「計算機概論」，全華科技圖書公司。(ISBN 957-21-4554-1)

傅楸善教授 Chiou-Shann Fuh, Professor

學術期刊論文 Journal articles

1. T. C. Tseng, T. F. Shih, and C. S. Fuh, "Anti-Spoofing of Live Face Authentication on Smartphone," Journal of Information Science and Engineering, https://journal.iis.sinica.edu.tw/paper/1/190475-2.pdf?cd=CBCAC35FAB71A5CBF, pp. 1-13, 2020.

2. J. Y. Hung, Y. H. Wei, C. H. Huang, L. W. Chen, C. S. Fuh, and S. L. Liao, "Survival Outcomes of Eye-Sparing Surgery for Adenoid Cystic Carcinoma of Lacrimal Gland," Japanese Journal of Ophthalmology, Vol. 64, Issue 4, pp. 344-351, https://doi.org/10.1007/s10384-019-00671-w, 2019.

3. C. K. Liaw, Y. P. Chen, T. Y. Wu, C. S. Fuh, and R. F. Chang, "New Computerized Method in Measuring the Sagittal Bowing of Femur from Plain Radiograph—A Validation Study," Journal of Clinical Medicine, Vol. 8, pp. 1598:1-10, doi:10.3390/jcm8101598, 2019.

研討會論文 Conference & proceeding papers

1. Y. H. Tsai, M. C. Tseng, C. S. Fuh, and C. Y. Wang, "Detection of Driver Drowsiness Using Multi-Task Learning," Proceedings of International Congress on Natural Sciences and Engineering, Nagoya, Japan, Paper# 10103, pp. 1-9, 2020.

2. J. C. Wu, B. J. Lin, B. Y. Zeng, L. C. Fu, C. S. Fuh, and T. L. Liu, "Cast Search via Two-Stream Label Propagation," Proceedings of ICCV Workshop on WIDER Cast Search with Portrait, Seoul, Korea, pp. 1-5, 2019.

3. H. R. Zhang, C. K. Huang, and C. S. Fuh, "Automatic Livestock Volume Measure with Artificial Intelligence System," Proceedings of International Conference on Unmanned System Application-Geoinformatics, Agriculture, Manufacturing & Environment, Chiang Mai, Thailand, Paper UA190010-C2, pp. 1-4, 2019.

黃俊升教授 Chiun-Sheng Huang, Professor

學術期刊論文 Journal articles

1. von Minckwitz, G., Huang, C.S., Mano, M.S., Loibl, S., Mamounas, E.P., Untch, M., Wolmark, N., Rastogi, P., Schneeweiss, A., Redondo, A., Fischer, H.H., Jacot, W., Conlin, A.K., Arce-Salinas, C., Wapnir, I.L., Jackisch, C.,

DiGiovanna, M.P., Fasching, P.A., Crown, J.P., Wulfing, P., Shao, Z., Rota Caremoli, E., Wu, H., Lam, L.H., Tesarowski, D., Smitt, M., Douthwaite, H., Singel, S.M., Geyer, C.E., Jr. & Investigators, K. Trastuzumab Emtansine for Residual Invasive HER2-Positive Breast Cancer. New England Journal of Medicine (2019).

2. Chiang, T.C., Huang, Y.S., Chen, R.T., Huang, C.S.* & Chang, R.F.* Tumor Detection in Automated Breast Ultrasound Using 3-D CNN and Prioritized Candidate Aggregation. IEEE Transactions on Medical Imaging 38, 240-249 (2019).
3. Chen, P.D., Hu, R.H., Liang, J.T., Huang, C.S. & Wu, Y.M. Toward a fully robotic surgery: Performing robotic major liver resection with no table-side surgeon. Int J Med Robot 15, e1985 (2019).
4. Hsiao, F.H., Kuo, W.H., Jow, G.M., Wang, M.Y., Chang, K.J., Lai, Y.M., Chen, Y.T. & Huang, C.S. The changes of quality of life and their correlations with psychosocial factors following surgery among women with breast cancer from the post-surgery to post-treatment survivorship. Breast 44, 59-65 (2019).
5. Wu, C.Y., Chen, P.D., Chou, W.H., Liang, J.T., Huang, C.S. & Wu, Y.M. Is robotic hepatectomy cost-effective? In view of patient-reported outcomes. Asian J Surg (2019)
6. Lin CH, Yap YS, Lee KH, Im SA, Naito Y, Yeo W, Ueno T, Kwong A, Li H, Huang SM, Leung R, Han W, Tan B, Hu FC, Huang CS, Cheng AL, Lu YS. Contrasting Epidemiology and Clinicopathology of Female Breast Cancer in Asians versus the US Population. Journal of the National Cancer Institute, 19 May 2019 pii: djz090. doi: 10.1093/jnci/djz090. [Epub ahead of print]
7. Yang, P.S., Lee, Y.H., Chung, C.F., Chang, Y.C., Wang, M.Y., Lo, C., Tsai, L.W., Shih, K.H., Lei, J., Yu, B.L., Cheng, S.H., Huang, C.S.*. A preliminary Report of Head-to-Head Comparison of 18-Gene-Based Clinical Genomic Model and Oncotype DX 21-Gene Assay for Predicting Recurrence of Early-stage Breast Cancer. Japanese Journal of Clinical Oncology 49(11), 1029-1036 (2019)
8. Hurvitz SA, Martin M, Jung KH, Huang CS, Harbeck N, Valero V, Stroyakovskiy D, Wildiers H, Campone M, Boileau JF, Fasching PA, Afenjar K, Spera G, Lopez-Valverde V, Song C, Trask P, Boulet T, Sparano JA, Symmans WF, Thompson AM, Slamon D . Neoadjuvant Trastuzumab Emtansine and Pertuzumab in Human Epidermal Growth Factor Receptor 2-Positive Breast Cancer: Three-Year Outcomes From the Phase III KRISTINE Study. Journal of Clinical Oncology 37(25), 2206-2216 (2019)
9. Hurvitz, S.A., Martín, M., Press, M.F., Chan, D., Fernandez-Abad, M., Petru, E., Rostorfer, R., Guarneri, V., Huang, C.S., Barriga, S., Wijayawardana, S.R., Brahmachary, M., Ebert, P. J., Hossain, A., Liu, J., Abel, A., Aggarwal, A., Jansen, V.M., Slamon, D.J. Potent cell cycle inhibition and upregulation of immune response with abemaciclib and anastrozole in neoMONARCH, Phase 2 neoadjuvant study in HR+/HER2- breast cancer. Clinical Cancer Research 26(3), 566-580 (2020)
10. Chen, C.H., Lu, Y.S., Cheng, A.L., Huang, C.S., Kuo, W.H., Wang, M.Y., Chao, M., Chen, I.C., Kuo, C.W., Lu, T.P., Lin, C.H.. Disparity in Tumor Immune Microenvironment of Breast Cancer and Prognostic Impact: Asians versus Western Populations. The Oncologist 25(1), e16-e23 (2020)
11. Moon, W.K., Huang, Y.S., Hsu, C.H., Chang Chien, T.Y., Chang, J.M., Lee, S.H., Huang, C.S., Chang, R.F. Computer-aided tumor detection in automated breast ultrasound using a 3-D convolutional neural network. Computer Methods and Programs in Biomedicine 190, 105360 (2020)
12. Lin, P.H., Chen, M., Tsai, L.W., Lo, C., Yen, T.C., Huang, T.Y., Chen, C.K., Fan, S.C., Kuo, S.H., Huang, C.S.*. Using next generation sequencing to redefine BRCAness in triple-negative breast cancer. Cancer Science 2020 Jan 20. doi: 10.1111/cas.14313. [Epub ahead of print]
13. Conte, P., Schneeweiss, A., Loibl, S., Mamounas E.P., Minckwitz G., Mano M.S. Untch M., Huang, C.S., Wolmark N., Rastogi P., D' Hondt V., Redondo A., Stamatovic L., Bonnefoi H., Castro-Salguero H.,

Fischer H.H., Wahl T., Song C., Boulet T., Trask P., Geyer Jr C.E. Patient-reported outcomes from KATHERINE: A phase 3 study of adjuvant trastuzumab emtansine versus trastuzumab in patients with residual invasive disease after neoadjuvant therapy for human epidermal growth factor receptor 2–positive breast cancer. Cancer 126(13), 3132-3139 (2020)

阮雪芬 特聘教授 Hsueh-Fen Juan, Distinguished Professor

學術期刊論文 Journal articles

1. Cheung, H. Y. C., Hsu, C.-L., Lin, T.-Y., Chen, W.-T., Wang, Y.-C., Huang, H.-C.*, Juan, H.-F.* (2020) "ZNF322A-mediated protein phosphorylation induces autophagosome formation through modulation of IRS1-AKT glucose uptake and HSP-elicited UPR in lung cancer" Journal of Biomedical Science 27(1):75.
2. Wang, W.-H., Hsu, C.-L., Huang, H.-C.*, Juan, H.-F.* (2020) "Quantitative phosphoproteomics reveals cell alignment and mitochondrial length change under cyclic stretching in lung cells" International Journal of Molecular Sciences 21(11):E4074.
3. Yin, C.-F., Kao, S.-C., Hsu, C.-L., Cheung, C. H.Y., Chang, Y.-W., Huang, H.-C.*, Juan, H.-F.* (2020) "Phosphoproteome analysis reveals dynamic heat shock protein 27 phosphorylation in tanshinone IIA-induced cell death" Journal of Proteome Research 19(4):1620-1634.
4. Lee, P.-C. Chen, S.-T., Kuo, T.-C., Lin, T.-C., Lin, M.-C., Huang, J., Hung, J.-S., Hsu, C.-L., Juan, H.-F., Lee, P.-H., and Huang, M.-C. (2020) "C1GALT1 is associated with poor survival and promotes soluble Ephrin A1-mediated cell migration through activation of EPHA2 in gastric cancer" Oncogene 39(13):2724-2740.
5. Lee, W.-H., Chen, K.-P., Wang, K., Huang, H.-C.*, Juan, H.-F.* (2020) "Characterizing the cancer-associated microbiome with small RNA sequencing data" Biochemical and Biophysical Research Communications 522:776-782.
6. Chang, H.-C., Huang, H.-C., Juan, H.-F.*, Hsu, C.-L* (2019) "Investigating the role of super-enhancer RNAs underlying embryonic stem cell differentiation" BMC Genomics 20(Suppl 10):896.
7. Hsieh, C.-H., Cheung, C. H. Y., Liu, Y.-L., Hou, C.-L., Hsu, C.-L., Huang, C.-T., Yang, T.-S., Chen, S.-F., Chen, C.-N., Hsu, W.-M.*, Huang, H.-C.*, Juan, H.-F.* (2019) "Quantitative proteomics of Th-MYCN transgenic mice reveals aurora kinase inhibitor altered metabolic pathways and enhanced ACADM to suppress neuroblastoma progression" Journal of Proteome Research 18(11):3850-3866.
8. Cheung, H. Y. C., Hsu, C.-L., Tsuei, C.-Y., Kuo, T.-T., Huang, C.-T., Hsu, W.-M., Chung, Y.-H., Wu, H.-Y., Hsu, C.-C., Huang, H.-C.*, Juan, H.-F.* (2019) "Combinatorial targeting of MTHFD2 and PAICS in purine synthesis as a novel therapeutic strategy" Cell Death & Disease 10:786.
9. Wu, P.-Y., Yu, I-S., Lin, Y.-C., Chang, Y.-T., Chen, C.-C., Lin, K.-H., Tseng, T.-H., Kargren, M., Tai, Y.-L., Shen, T.-L., Liu, Y.-L., Wang, B.-J., Chang, C.-H., Chen, W.-M., Juan, H.-F., Huang, S.-F., Chan, Y.-Y., Liao, Y.-F., Hsu, W.-M., Lee, H. (2019) "Activation of aryl hydrocarbon receptor by kynurenine impairs progression and metastasis of neuroblastoma" Cancer Research 79(21):5550-5562.
10. Huang, C.-T., Hsieh, C.-H., Lee, W.-C., Liu, Y.-L., Yang, T.-S., Hsu, W.-M., Oyang, Y.-J., Huang, H.-C.*, Juan, H.-F.* (2019) "Therapeutic targeting of non-oncogene dependencies in high-risk neuroblastoma" Clinical Cancer Research 25(13):4063-4078.
11. Huang, C.-T., Hsieh, C.-H., Chung, Y.-H., Oyang, Y.-J., Huang, H.-C.*, Juan, H.-F.* (2019) "Perturbational gene-expression signatures for combinatorial drug discovery" iScience 15:291-306 (Cell Press).
12. Yang, T.-W., Sahu, D., Chang, Y.-W., Hsu, C.-L., Hsieh, C.-H., Huang, H.-C.*, Juan, H.-F.* (2019) "RNA-binding proteomics reveals MATR3 interacting with lncRNA SNHG1 to enhance neuroblastoma progression" Journal of Proteome Research 18: 406-416.
13. Chang, J.-Y., Yu, W.-H., Juan, H.-F.*, Huang, H.-C.* (2018) "Dynamics of alternative polyadenylation in human preimplantation embryos" Biochemical and Biophysical Research Communications 504(4):727-733.

研討會論文 Conference & proceeding papers

1. Chang, H.-C., Huang, H.-C., Juan, H.-F.*, Hsu, C.-L* (2019) "Investigating the role of super-enhancer RNAs underlying embryonic stem cell differentiation" Joint 30th International Conference on Genome Informatics and Australasian Bioinformatics and Computational Biology Society (GIW/ABACBS 2019), Sydney, Australia, Dec. 9-11, 2019. (Oral Presentation)
2. Cheung, C.H.Y., Hsu, C.-L., Lin, T.-Y., Chen, W.-T., Wang, Y.-C., Huang, H.-C.*, and Juan, H.-F.* "Quantitative Proteomics and Phosphoproteomics Analyses Reveal the Regulatory Roles of ZNF322A in lung cancer" 2019 Multiomics and precision medicine joint conference, Tainan, Taiwan, Dec. 07-08, 2019. (Young scientist oral presentation competition - 2nd place)
3. Lee, W.-H., Chen, K.-P., Wang, K., Huang, H.-C.*, and Juan, H.-F.* "Characterizing the cancer-associated microbiome with small RNA sequencing data" 2019 Multiomics and precision medicine joint conference, Tainan, Taiwan, Dec. 07-08, 2019. (Poster Award)
4. Hsieh, C.-H., Cheung, C.H.-Y., Liu, Y.-L., Hou, C.-L., Hsu, C.-L., Huang, C.-T., Yang, T.-S., Chen, S.-F., Chen, C.-N., Hsu, W.-M.*, Huang, H.-C*. and Juan, H.-F.* "Quantitative Proteomics of Th-MYCN Transgenic Mice Reveals Aurora Kinase Inhibitor Altered Metabolic Pathways and Enhanced ACADM To Suppress Neuroblastoma Progression" 2019 Multiomics and precision medicine joint conference, Tainan, Taiwan, Dec. 07-08, 2019. (Poster Award)
5. Kao, Y.-C., Chang, N.-W., Lai, C.P., Huang, H.-C.*, and Juan, H.-F.* "The role of ectopic ATP synthase in cell-to-cell communication by extracellular vesicles" 2019 The Taiwan Society for Biochemistry and Molecular Autumn Camp, New Taipei City, Taiwan, Nov. 15-17, 2019.
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7. Wang, W. H., Hsu, C. L., Huang, H.-C.*, and Juan, H.-F.* "Cyclic stretch-induced biological functions by phosphoproteomics profiling" 2019 Annual Meeting of Taiwan Society for Mitochondrial Research and Medicine, Taipei, Taiwan, Nov. 09, 2019. (Honorable Award)
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捌 教師得獎、專利及技術轉移
Award、patents and Technology Transfer

一、教師得獎

Award

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1. 阮雪芬，科技部傑出研究獎，2020
2. 劉浩澧，徐有庠基金會 有庠科技發明獎，2020

※ 2019

1. 黃俊升，北美校友基金會 2019年最佳臨床教師，2019
2. 阮雪芬，科技部大專學生研究計畫研究創作獎之指導教授獎，2019
3. 張瑞峰，2019未來科技突破獎，2019
4. 曾宇鳳團隊，2019未來科技展未來科技突破獎，2019
5. 曾宇鳳團隊，第16屆國家新創獎，2019
6. 林致廷，第16屆國家新創獎 臨床新創獎續獎，2019
7. 李百祺，IEEE UFFC DISTINGUISHED LECTURER，2019/1-2020/6
8. 孫啟光，國立臺灣大學學術研究成果傑出獎，2019
9. 孫啟光，國立臺灣大學107學年度全校全英語授課專任教師教學優良獎，2019
10. 林致廷，第15屆國家新創獎 臨床新創獎，2019
11. 李心予，美國生理學會會士，2019
12. 成佳憲，American Society for Radiation Oncology -FASTRO-Fellow

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1. 李百祺，107年度中國工程師學會傑出工程教授獎，2018
2. 李百祺，IFMBE Vladimir K. Zworykin Award，2018
3. 鍾孝文，台大教學傑出獎，2018
4. 黃俊升，2018 Outstanding Teaching Award，2018
5. 魏安祺，MOST Young Scholar Fellowship，2018-2023

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1. 莊曜宇，國立臺灣大學電資學院106年學術貢獻獎，2017。
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