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

2017年第 11 期年報

BEBI Annual Report, No. 11 / 2017

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

BEBI Annual Report, No. 11 / Sep. 2017

序言 Preface

十週年所慶熱鬧歡騰的氣氛記憶猶新，轉眼間又過了一年，走過十年里程碑的生醫電資所，我們面對未來繼續邁步向前。

過去這一年，我們積極充實研究能量，繼生醫核心實驗室之後，我們挹注了許多資源，有計劃的建構了高速運算中心，希望能為進行生醫資訊研究的師生們提供雲端運作的平台。實體空間是有限的，但在物聯網時代，世界能藉由網際網路而密切連結，在這樣的趨勢下，我們希望高速運算中心能擔任雲端基地的角色，為本所師生提供豐富的研究運算資源。

在教學方面，本所積極邀請國外不同學者進行交流，如香港中文大學的何亦平博士(Yi-Ping Ho, Ph.D.)、美國德州大學葉信志博士 (Tim Yeh, Ph.D)，除了分享研究成果外，更對同學未來的生涯規劃提出建議。為鼓勵學生出席國際學術會議發表研究成果，並且拓展視野強化研究能力， 除了向科技部及其他單位申請補助外，所上亦提供經費補助同學們出國，今年申請補助的同學如同往年依舊相當踴躍。

生醫電資所因為跨領域性質，所內教師來源眾多，為了加強本所教師的凝聚力，我們持續每兩年舉辦一次教師研習營，希望能藉此活動彙整老師們的意見，促進教師間的互動與交流。今年，我們來到苗栗山間舉行研習會議，我們重視產學合作的成效與機會，更對於少子化所帶來的招生困境感到憂心，我們在會議中檢視本所現況並積極規劃未來的方向，兩天一夜的教師研習營就在這些熱烈的討論中圓滿完成。

在招生方面，由於本所的招生狀況在全院、甚至全校各系所之間表現極佳，因此，本所得以在107年度的碩士班招生中增加一名招生名額，這對我們來說是相當正面的肯定。本所亦負責統籌電機學群105年度的畢業典禮，現場聚集了數百名師生與家長，在整齊有秩序的流程中典禮順利完成。我們衷心期許這些學成的社會新鮮人，能在職場上發光發熱，擔負起社會責任，成為台大生醫電資所的驕傲。

最後，「十年樹木，百年樹人」，在教育的路上我們依舊任重道遠，上一個十年所栽下的樹木已然逐漸茁壯，而下一個十年的樹苗們正等待著我們的殷勤照拂，我期許生醫電資所能如春風化雨，為有志於此的學子們提供最豐富的資源，等待樹苗與樹木蔚然成林的那天到來，會是身為教育者的我們最動人的成就。

2017年9月

序言 Preface

Even though memory of the joyful celebration for our Institute's tenth anniversary is still fresh in mind, another year has passed in the blink of an eye. As the Graduate Institute of Biomedical Electronics and Bioinformatics have passed the 10-year milestone, we are committed to the future development.

For the past year, we have devoted lots of resources to increase our research capacity. After establishing the Biomedical Core Laboratory, we have been put a great deal of resources into the establishment of a high performance computing center (HPC), this is in hopes of providing a cloud- computing platform for faculty to conduct bioinformatics research. The advent of the Internet age allows us to overcome the limitations of physical space. It is a trend that has led to the platform of the HPC, providing plentiful research and computing resources for the Institute.

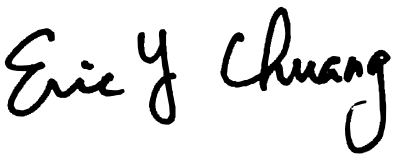
In terms of teaching, the Institute has actively sought out a variety of overseas scholars to share their expertise or have possible collaboration, such as Yi-Ping Ho, Ph.D. from the Chinese University of Hong Kong and Tim Yeh, Ph.D. from the University of Texas at Austin. The Institute encourages students to attend international academic conferences in order to present their research findings, broaden their horizons, and enhance their research experience. The Institute offers a number of scholarships to cover student travel expenses. In addition to applications for travel grants from the Ministry of Science and Technology and other organizations, our students have been actively applied for the institute's subsidies for attending international conferences.

Faculty members at the Graduate Institute of Biomedical Electronics and Bioinformatics come from a wide variety of backgrounds. However, to improve cohesiveness among the Institute's faculty, we hold biennial workshops for faculty members in which their views are compiled, in order to promote greater academic among faculty members. This year, the workshop held in the mountains of Miaoli focused on the fruitful results of industry-academia collaboration and possible strategies to address the problem of student enrollment causing from low birth rates in Taiwan. In this meeting, we reviewed current status of the Institute and positively made a future plan; therefore, this workshop brought to a successful ending.

In recognition of the Institute's exemplary performance in recruitment, especially when compared to other colleges and departments, we have been granted to increase our postgraduate student quota by one. The Institute was also responsible for organizing the joint commencement ceremony of the 2016 academic year for all NTU departments and graduate institutes related to electrical engineering. Hundreds of faculty, students, and parents gathered at the NTU Sport Center to participate in the well-planned and well-executed ceremony. We are looking forward to the day when our students' success in their professional and academic careers in the future.

There is a saying in Chinese, "It takes ten years to grow trees, but it takes a hundred years to develop people." This shows that our responsibility as educators is significant.

The first generation of graduates over the past ten years, like the trees in the proverb, have grown into mature professionals. I sincerely hope that our institute can provide resources for our student and until they have a great development, growth and contribution in society, it will be the most wonderful achievement to us.



September 2017

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13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42名碩士新生加入。本所有37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 13 new Ph.D. students every year. Our master program started in August, 2007 with 42 new students entering the institute annually. There are 37 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 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 學術活動
Academic Activities

一、第六屆獎勵研究創新獎
The 6th Biomedical Electrical Engineering reward research and innovation

本所為鼓勵學生研究創新並提昇本所及本校之國際學術地位，於民國100年通過〈獎勵研究創新辦法〉並施行之。八月開放所上同學申請，並在本所招生及學術委員會上審議通過得獎名單後，於105年12月26日(一)舉行第六屆頒獎典禮。本獎項特別邀請傑出校友-泰博科技研發協理-朱孟煌先生擔任頒獎人，同時邀請副院長、本所老師、校友、學生共襄盛舉，參與老師有莊曜宇、李百祺、陳志宏、劉志文、趙坤茂、林致廷、黃念祖等諸位老師，及所上100多位同學熱烈參與。

本獎項共分成兩大項，分別是學生傑出研究獎、年度最佳碩士及博士學位論文獎。本次學生傑出論文獎獲獎學生為：得獎學生有梁佑任、邱鈺喬、何德威、薛孝亭、高于婺；年度最佳碩士論文獎的獲獎學生為蔡宗翰；年度最佳博士論文獎則由邱鈺喬、何德威獲得。此三個獎項除了鼓勵所上學生勇於在國際的舞台上創新研究外，同時也頒發年度榮譽榜，獲獎學生有張得一、翁睿謙、蘇威宇、謝秉翰、張育銓、黃柏承、胡翔崴、楊昇。

The BEBI encourages students to research innovation and promote the academic international status. Since 2011, the prize reward has been bestowing "Research Innovation Award" to students. In August, Award was opened for student to apply. The BEBI Admissions and Academic Committee evaluated the final award list and the 6th "Research Innovation Award" ceremony was held on December 26th, 2016. Distinguished alumni, TaiDoc Technology' s R&D Manager Mr. Meng-Huang Chu, was invited to present students with their awards. Other distinguished faculties invited to participate in this event included the Associate Dean of Electrical engineering and Computer Science, professors, alumni, and students from BEBI. Professors who participated in the event were Eric Y. Chuang, Pai-Chi Li, Jyh-Horng Chen, Chih-Wen Liu, Kun-Mao Chao, Chih-Ting Lin and Nien-Tsu Huang. In addition, approximately 100 students attended the ceremony.

Two types of awards were given: The Graduate Student Outstanding Research and Best Master Thesis Award and The Best Ph.D. Dissertation Award of the Year. The students awarded for the Graduate Student Outstanding Paper Award included : Yu-JenLiang, Yu-Chiao Chiu, Te-Wei Ho,Hsiao-Ting Hsueh, Yu-Chiu Kao.The students awarded for the Best Master Thesis Award included : Tsung-Han Tsai. The student awarded for the Best Ph.D. Dissertation Award included :

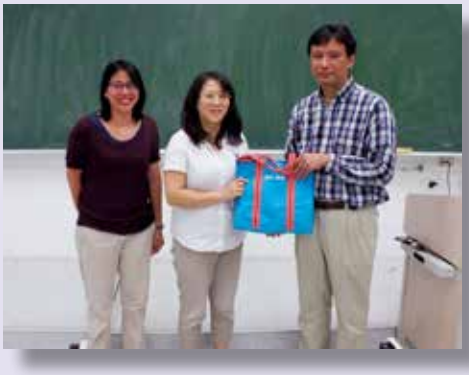
Yu-Chiao Chiu, Te-Wei Ho. Students who received these awards were given an international level of recognition for their innovative research. Furthermore, Te-I Chang, Rui-Cian Weng, Wei-Yu Su, Ping-Han Hsieh,Yu-Chuan Chang, Bo-Cheng Huang, Hsiang-Wei Hu,Sheng Yang, received the BEBI Honorary Award.

獎勵研究創新

二、博士班招生說明會
BEBI Introduction to prospective students: College of medicine (2017/03/27)

三、碩士班新生說明會BEBI Introduction to new students: (2017/4/10)

2016.09.19	台北市消防局金華分隊 朱春成小隊長	環安衛講習地震須知
2016.09.26	中研院生物醫學科學研究所 林榮信研究員	Simulating the Biochemical World with Modern Computational Methods
2016.10.03	台大中國文學系 鄭毓瑜教授	想像一條河
2016.10.17	萊鎂醫療器材 陳仲竹董事長	從未滿足需求到醫療器材創業
2016.10.24	商之器科技股份有限公司 陳奇材總經理	以科技驅動醫療世代──科技對醫療的改變
2016.10.31	清華大學電機工程學系 鄭桂忠教授	仿生電子的過去、現在、與未來
2016.11.14	前中達電通事業部總經理 呂文平博士	二十一世紀企業競爭的速度因素
2016.11.21	清華大學生醫工程與環境科學系 葉秩光教授	超音波診療一體技術與發展
2016.11.28	台大醫院副院長 林明燦教授	醫療與高科技：外科醫師的醫療革命
2016.12.05	校外參訪：商之器科技	
2016.12.12	Burris LLC 律師事務所 翁麗華律師	美國專利制度、專利侵權、和專利檢索介紹
2016.12.19	交通大學生物科技系 黃憲達教授	運用生醫大數據於精準醫學 Use of Big Bio-Data in Precision Medicine
2017.03.06	中央研究院 廖俊智院長	Dynamic Stability as a Criterion for Metabolic Systems Analysis: An Ensemble Modeling Approach
2017.03.13	中研院基因體研究中心 洪上程主任	醣聞軼趣
2017.03.20	台大醫學系主任吳明賢教授	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
2017.03.27	安盛生科陳彥宇 技術長	An Engineer’ s Entrepreneurial Journey into the Biomedical World
2017.04.10	台大醫院外科副主任 梁金銅教授	機械手臂輔助手術在台灣施行的現況和展望
2017.04.24	中研院化學所 陳玉如所長	New Mass Spectrometry-based Proteomics Strategy for Precision Biology
2017.05.01	新光國際創投李光斌 執行副總經理	創投業者觀點下創業機會的辨識
2017.05.08	台大國企系 / 創創學程執行長 李吉仁教授	啟動你的創業飛輪
2017.05.15	香港中文大學電子工程學系 何亦平助理教授	Combining Microfluidics and Nanosensors for Future Diagnostics
2017.05.22	台大醫學院副院長 倪衍玄教授	微生物體到精準醫療的大數據走向
2017.06.05	校外參訪：友信醫療集團	
2017.06.12	台大歷史系 周婉窈教授	白色恐怖、轉型正義，以及我們的責任



1. 2016.09.26
中研院生物醫學科學研究所林榮信研究員
「Simulating the Biochemical World with Modern Computational Methods」

2. 2016.10.03
台大中文系鄭毓瑜教授 「想像一條河」

4. 2016.10.17
萊鎂醫療器材陳仲竹董事長
「從未滿足需求到醫療器材創業」

4. 2016.10.24
商之器科技股份有限公司陳奇材總經理
「以科技驅動醫療世代──科技對醫療的改變」

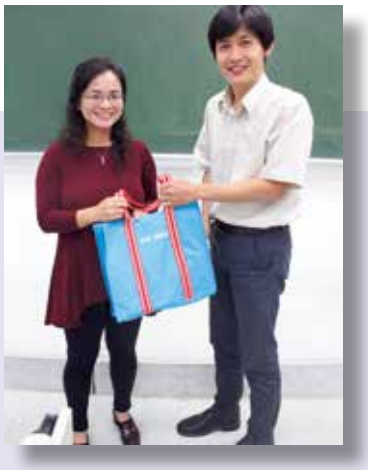
5. 2016.10.31
清華大學電機工程學系鄭桂忠教授
「仿生電子的過去、現在、與未來」

6. 2016.11.14
前中達電通事業部總經理呂文平博士
「二十一世紀企業競爭的速度因素」

7. 2016.11.21
清華大學生醫工程與環境科學系葉秩光教授
「超音波診療一體技術與發展」

8. 2016.11.28
台大醫院林明燦副院長
「醫療與高科技：外科醫師的醫療革命」

9. 2016.12.05 校外參訪：商之器科技股份有限公司



10. 2016.12.12
Burris LLC律師事務所翁麗華律師
「美國專利制度、專利侵權、和
專利檢索介紹」

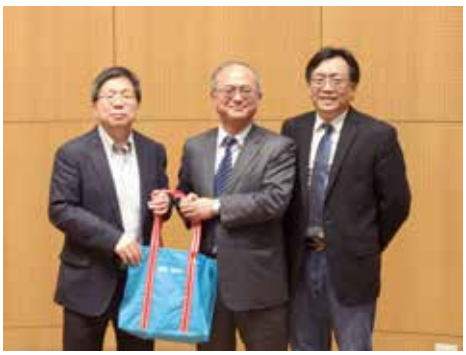
11. 2016.12.19
交通大學生物科技系黃憲達教授
「運用生醫大數據於精準醫學」

12. 2016.12.26 第六屆獎勵研究創新頒獎典禮

13. 2017.03.06
中央研究院廖俊智院長「Dynamic Stability as a Criterion for Metabolic Systems Analysis: An Ensemble Modeling Approach」

14. 2017.03.13
中研院基因體研究中心洪上程主任 「醣聞軼趣」

15. 2017.03.20
台大醫學系主任吳明賢教授
「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」



16. 2017.03.27
安盛生科陳彥宇技術長
「An Engineer's Entrepreneurial Journey into the Biomedical World」

17. 2017.04.10
台大醫院外科副主任梁金銅教授
「機械手臂輔助手術在台灣施行的現況和展望」

18. 2017.04.24
中研院化學所陳玉如所長
「New Mass Spectrometry-based Proteomics Strategy for Precision Biology」

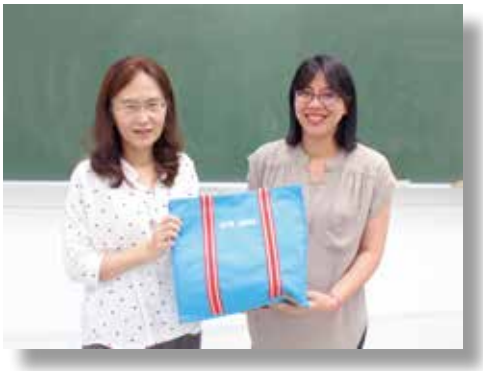
19. 2017.05.01
新光國際創投李光斌執行副總
「創投業者觀點下創業機會的辨識」

20. 2017.05.08
台大國企系李吉仁教授
「啟動你的創業飛輪」

21. 2017.05.15
香港中文大學電子工程學系何亦平助理教授
「Combining Microfluidics and Nanosensors for Future Diagnostics」

22. 2017.05.22
台大醫學院倪衍玄副院長
「微生物體到精準醫療的大數據走向」

23. 2017.06.05友信醫療集團蒞臨參訪



24. 2017.06.12
台大歷史系周婉窈教授
「白色恐怖、轉型正義，以及我們的責任」

五、國立臺灣大學電機資訊學院105學年度畢業典禮
2017 Commencement of College of Electrical Engineering and Computer Science, NTU

六、 2016/07/07~07/09 生醫電子資訊營
Biomedical Electronics and Bioinformatics Camp on July, 7-9, 2016

2017年臺大生醫電資營於7月6日至7月8日假臺大博理館演講廳舉辦，今年的主題為「台灣未來醫療產業的發展趨勢：技術、人才與產業的結合」，從介紹台灣新世代生醫技術出發，透過技轉、創業、法規等不同面向的主題演講進行發想，就台灣未來醫療產業將會面臨的挑戰以及未來的發展趨勢做深入淺出的探討。

在學術演講方面，我們共邀請了九位分別來自公司企業、校內及學術界等講者，分別從技轉、創業、學術以及法規等不同角度切入來進行演講以及說明，透過講者分享其專業知識以及經歷，激發參與隊員在專題競賽中的發想以及創意。

今年我們採用類似workshop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prototype。在活動的最後一天，各組都成功地將他們這三天所發想的解決辦法以及產品原型展現出來，亦獲得了評審們的高評價。

本次活動總計有40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，幾乎都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 2017 National Taiwan University Biomedical Electronics and Bioinformatics Camp was held from July 6th to July 8th at NTU Barry Lam Hall.The aim was "The trend of Taiwan biomedical industry: integration of technologies, talentsand industries this year. We start from introduction of new generation technologies,throughtechnology transfer, entrepreneurship, statute to discuss this topic from different aspects and explore the challenge and the trend of Taiwan medical industry.

When it comes to lectures,we invited 9 speakers from industry and academia gave lectures with their professional knowledge and own experience. Particular topics inspiredparticipants' ideas for project competition.

In this year, weasked for each team to choose an unsolved problem from four given fields. By workshop-like discussion, every team needs to put forward a reasonable solution with prototype. At the end, all participants gave successful presentations with prototype and market analysis which are highly appreciated by judgeson the last day of the camp.

A total of 40 participants joined the event, including college students, graduated students and members of the community from biomedical and engineering professionals. According to our questionnaires, all participants were quite satisfied with the program and were willing to participate again. At the same time, they gave high ratings on speaker presentations.Next year, we will foster new talents from academics and the industry and continue to hold the Biomedical Electronics and Bioinformatics Camp.

肆 學術交流 Academic Exchanges

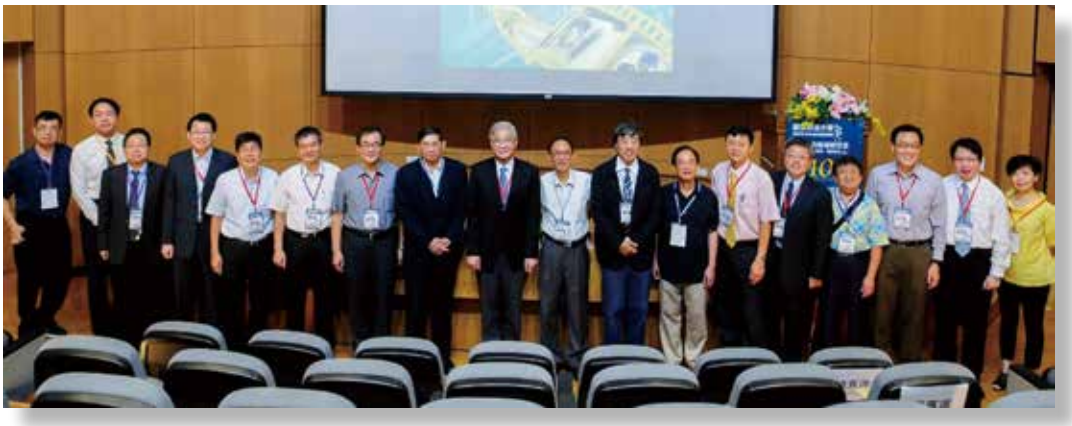
一、 10週年所慶學術交流活動 The 10th Anniversary of BEBI

國立臺灣大學生醫電子與資訊學研究所創立10週年所慶在2016年10月1日(六)於校總區博理館隆重舉行。活動開幕式由楊泮池校長、郭大維副校長、電資學院陳銘憲院長以及中央研究院陳仲瑄院士親臨致詞揭開序幕。

本次活動以「跨域整合‧生醫創新‧展望未來」為宗旨，藉由專題演講、產官學論壇、校友座談等三大主題邀請各界傑出人士共襄盛舉，除了有來自科技部工程司、中央研究院、工業技術研究院、之初創投、台灣飛利浦公司等產官學先進、專家一同探討未來的生醫科技趨勢與發展方向外，另也邀請多位創業卓然有成的所友們回娘家，與師長、學弟妹歡聚一堂分享創業過程、職場經驗甘苦談，讓整場活動激盪出不少的火花。

自籌備期到活動順利完成，我們花費了近半年時間，在全體師生、行政同仁的通力合作之下，10週年所慶活動圓滿結束。本次與會人數共約100人，感謝各屆所友的熱情參與，有大家無私的經驗傳承，本所因而更具向心力，期盼二十重聚時還能有更多所友加入。同時也感謝各方的與會代表在不同的面向上拋磚引玉，分享自身學術的創見與豐富的人生閱歷，讓學生可以從意見領袖的互動與思辯體會深度學習的重要。臺大生醫電資所一路走來篳路藍縷，如今壯大為擁有將近40位教師、學生百餘名的規模，這是所有成員共同努力耕耘的成果。未來臺大生醫電資所將繼續努力茁壯，迎向下一個璀璨10年。

The 10th Anniversary of the Graduate Institute of Biomedical Electronics and Bioinformatics of National Taiwan University was held on October 1st, 2016 (Sat) at NTU Barry Lam Hall. The opening ceremony was officiated by President Pan-Chyr Yang, Executive Vice President Prof. Tei-Wei Kuo, Dean of the College of Electrical Engineering and Computer Science, Ming-Syan Chen, and Distinguished Research Fellow & Director of the Genomics Research Center of Academia Sinica, Dr. Chung-Hsuan Chen.



十週年所慶學術交流

專題演講一
中央研究院陳仲瑄院士

專題演講一
中央研究院陳垣崇院士

專題演講一
中央研究院李文雄院士

專題演講一
中央研究院孔祥重院士

The aim of this event was "interdisciplinary integration, biomedical innovation, and futureperspectives". Distinguished individuals from all disciplines were invited to participate in keynote speeches, industry-academic-government forums, and alumni forums Besides having distinguished members and experts from the Department of Engineering and Technologies, Academia Sinica, Industrial Technology Research Institute, AppWorks Ventures, and Philips Health System, Taiwan to talk about future trends and development of biomedicine, many former students who have achieved great success in starting their own businesses were also invited to share their startup or work experiences,, leading to many lively debates and discussions.

We spent nearly 6 months on this event, from the planning stages to its completion. With the combined efforts of the students, faculty, and administration, the 10th anniversary celebration came to a successful conclusion. Around 100 people attended this event. Big thanks to the alumni for their enthusiastic participation. By selflessly sharing their experiences with us, they brought this department closer together. We hope to see even more alumni at the 20th anniversary gathering. We would also like to thank representatives from each field who started conversations by sharing their academic insights and life experiences, so that students can understand the importance of in-depth learning through interaction and debates between opinion leaders. NTU BEBI faced many obstacles along the way, but its scale has grown to include nearly 40 faculty members and over a hundred students. This is all thanks to the hard work of everyone involved. NTU BEBI will continue to grow in the future, towards the next exciting10 years.

校友論壇

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. Aftercontinuous 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 405Room 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 706Room 706,MingDa Building
智慧型與精密運動控制實驗室 IPMC Lab.	陳永耀 Yung-Yaw Chen	明達館 604Room 604,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 701Room 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 702Room 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 704Room 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 426/129Room 426/129, EE 2
細胞行為實驗室 Cell Behavior Lab.	郭柏齡 Po-Ling Kuo	明達館 707Room 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 553Room 553, EE 2
紅外線元件實驗室 IR Device Lab.	李嗣涔 Si-Chen Lee	電機二館 451Room 451,EE 2

超音波影像實驗室 Ultrasonic Imaging Lab.	李百祺 Pai-Chi Li	明達館 731Room 731,MingDa Building
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 450Room 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 526Room 526,YongLin Biomedical Engineering Hall
人腦實驗室 Brain Imaging and Modeling Lab.	林發暄 Fa-Hsuan Lin	展書樓 703Room 703,Jan Su Hall
奈米生醫光電實驗室 Nano-Biophotonics Lab.	孫啟光Chi-Kuang Sun	電機二館 R406ARoom 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 703Room 703,MingDa Building
臨床磁振影像實驗室 Clinical Magnetic Resonance Imaging Lab.	吳文超 Wen-Chau Wu	明達館 704Room 704,MingDa Building
中研院生醫所 IBMS RM511	楊泮池 Pan-Chyr Yang	臺大醫院 NTUH
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 705Room 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 402Room 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 432Room 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 328Room 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 1105Room 1105,Life Science Building
醫學資訊實驗室 Medical Informatics Lab.	賴飛羆 Fei-pei Lai	德田館 346Room 346,CSIE Building
演算法實驗室 Algorithmic Research Lab.	呂學一 Hsueh-I Lu	德田館 406CSIE Building, Room 406
分子生醫資訊實驗室 Molecular Biomedical Informatics Lab.	歐陽彥正 Yen-Jen Oyang	德田館 410CSIE Building, Room 410
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 404Room 404,CSIE Building

陳中平 教授

Chung-Ping Chen, Professor

國立臺灣大學生醫電子與資訊學研究所教授
國立臺灣大學電子工程學研究所教授

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

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

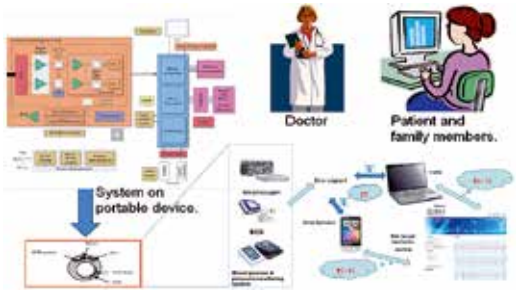
生醫及半導體光學製程影像處理、微處理機設計、VLSI電腦輔助設計、微波通訊線路設計、電力線通訊系統、生醫行動生理檢測系統

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

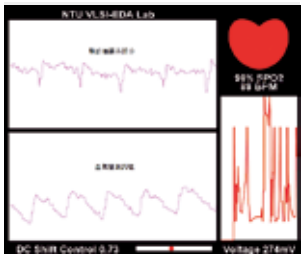
研究計畫 Research Projects

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
6. Telecare platform with portable biomedical system applied in Smartphone

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

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。

電機二館動物用 Bruker 7.0 Tesla

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.

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 Image, Functional MRI, Molecular imaging, Man Machine interface, Medical Engineering

研究計畫 Research Projects

1. 磁化率定量影像於磁振造影之生醫應用：動態定量之磁共振影像
2. 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
3. 構建中樞與週邊神經系統聯結之磁共振影像技術：定量化中風偵測與評估研究

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Department of Electrical Engineering, National Taiwan University

智慧型及精密運動控制實驗室

IPMC Lab.

本實驗室「智慧型精密運動控制實驗室」由陳永耀教授指導，位於明達館604室，其研究的主要方向為智慧型控制、微創手術自動化相關研究、以及超音波熱療。實驗室的近期研究領域包括智慧型內視鏡機器人研發、長距離視線追蹤系統、組織變型計算、組織內血管及腫瘤即時警示系統、超音波肝臟定位追蹤系統、機器人即時反向運動學計算、居家看護人員追蹤等主題。

內視鏡機器人系統研發之主要概念在以智慧型演算法配合視線追蹤及內視鏡機器人控制，達成內視鏡之有效操作，使操刀醫師能夠獨立進行微創手術，不需要額外的醫師人力協助操作內視鏡。同時，內視鏡自動化將可成為微創手術自動化的先期目標與成果。相關之研究包括:長距離視線追蹤系統，目標為追蹤操刀醫師在手術過程中之視線位置，做為判斷呈現內視鏡影像之依據，以期能配合操刀醫師之影像需求。組織變型計算及組織內血管及腫瘤即時警示系統之研發，希望能夠以計算方式，準確呈現組織以及血管、腫瘤之位置，以利微創開刀手術之進行。超音波肝臟定位追蹤系統延續前期超音波熱療研究，目標為在體外以超音波影像準確追蹤肝臟腫瘤，做為超音波熱療定位及導引之用。

本實驗室致力於將智慧型控制及影像演算法應用在微創手術及超音波熱療等生醫領域，改善人類生活。

Intelligent and Precision Motion Control (IPMC) Laboratory is located in Room 604, MinDa building, National Taiwan University. IPMC group is led by Prof. Yung-Yaw Chen, whose main research interests are on the intelligent control, the automation of minimally invasive surgery, and the liver tracking for HIFU therapy. Recent research project topics include Intelligent Endoscope Robot, Long-range Gaze Point Tracking, Computation on Tissue Deformation, Distance Detection of Blood Vessel and Tumor, Liver Tracking System for HIFU Therapy, Real-Time Robotic Inverse Kinematics Computations, Tracking in Home Care.

The major goal for the Intelligent Endoscope Robot project is to effectively operate the endoscope with a robot system such that no human operation is required for the endoscope manipulations, which is actually the first step toward the full automation of robotic surgeries. Related researches also include the Long-range Gaze Point Tracking, Computation on Tissue Deformation, Distance Detection of Blood Vessel and Tumor projects. Moreover, IPMC also conducts researches on HIFU-related therapeutic methods, such as the tracking of liver tumor for HIFU treatment. Also, IPMC has a long-term interest on home care systems.

IPMC dedicates on researches to integrate the intelligent control and image processing algorithms with the minimally invasive surgery and the HIFU therapy for a better life.

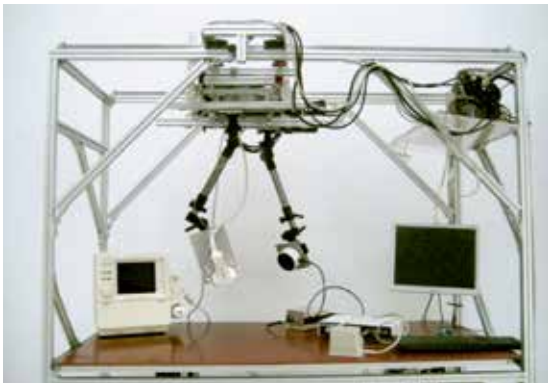
主要研究領域 Major Research Areas

智慧型控制、微創手術自動化、超音波加熱治療、居家看護

Intelligent control, Automation of minimally invasive surgery, Hyperthermia treatment planning, Home care system

研究計畫 Research Projects

1. 科技部三年期整合型計劃：
   智慧型微創手術內視鏡機器人系統研發 - 總計畫兼子計畫三：
   微創手術血管與腫瘤安全距離警示系統研發



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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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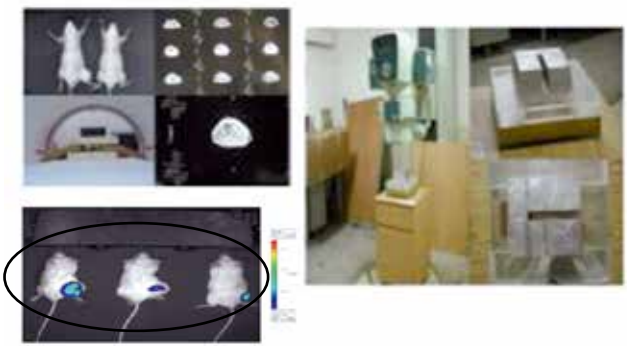
Professor , Graduate Institute of Oncology, National Taiwan University College of Medicine
Adjunct Professor, Graduate Institute of Clinical Medicine, National Taiwan University College of Medicine
Attending Physician, Division of Radiation Oncology, Department of Oncology, National Taiwan University Hospital

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

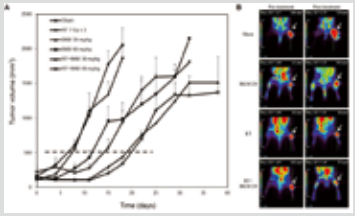
放射腫瘤學、放射物理學、放射生物學、癌症轉譯醫學
Radiation Oncology, Radiation Physics, Radiation Biology, Cancer Translational Medicine

研究計畫 Research Projects

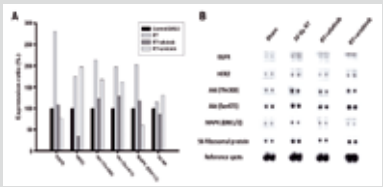
1. 探討磷脂醯肌醇3-激酶/蛋白質激酶B/哺乳動物雷帕黴素靶蛋白傳遞路徑及相關拮抗劑對於肝癌細胞放射抵抗性之作用機轉
   Investigation on the mechanisms of PI-3K/Akt/mTOR dependent radioresistance of epatocellularcarcinoma and the related inhibitors.
2. 表皮生長因子受體訊息傳遞路徑對表現基質金屬蛋白酶9之小鼠肺癌放射治療模式於腫瘤生長及轉移之機轉研究
   Mechanism investigation of EGFR/HER2 signaling pathway on tumor growth and metastasis by radiotherapy for MMP-9 expressed Lewis lung carcinoma.
3. 新一代EGFR酪氨酸激酶抑制劑可協同阻斷EGFR和HER2，克服膀胱癌細胞對放射治療的抗性：第二、三年機轉研究
   Synergistic blockade of EGFR and HER2 by new generation EGFRtyrosine kinase inhibitor overcomes radioresistance of bladdercancer cells: mechanistic studies

■ **研究計畫** - 1,3之代表圖及英文說明：

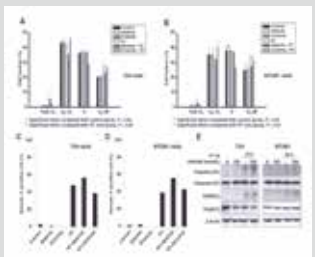
Combined BKM120 and radiotherapy (RT) enhances tumor suppressive activity in two BNL xenograft models.



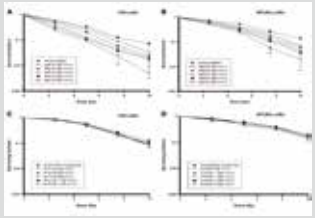
Concomitant EGFR and HER2tyrosine kinase inhibitionsignificantly suppressesradiation-activated signaling pathways in bladder cancer cells.



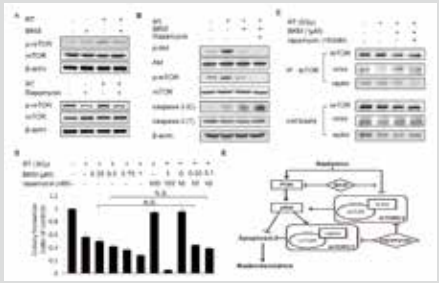
Tyrosine kinase blockade of both EGFR and HER2 by afatinib, not blockade of EGFR alone, promotes radiation-induced apoptosisin bladder cancer cells.



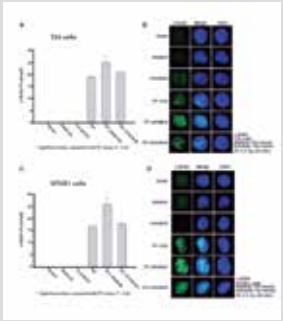
Dual blockade of EGFR and HER2 tyrosine kinases significantly radiosensitizes bladder cancer cells.



The addition of rapamycin to BKM120 enhances the inhibition of mTOR and Akt phosphorylation and increases caspase-3 activation in irradiated BNL cells.



The EGFR/HER2 dual inhibitor afatinib, not the EGFR inhibitor erlotinib, promotes radiation-induced DNA damage in bladder cancer cells.



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Eric Y. Chuang, Professor

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國立臺灣大學電機工程學系教授
國立臺灣大學生命科學系教授
國立臺灣大學流行病學與預防醫學研究所教授
國立臺灣大學生命科學院與中央研究院合辦-基因體與系統生物學學位學程教授
國立臺灣大學生醫電資所與中央研究院合辦-生物資訊學國際研究生學位學程教授
國立臺灣大學腫瘤醫學研究所教授
國立臺灣大學醫療器材研發中心副主任
國立臺灣大學基因體醫學研究中心-生物資訊暨生物統計核心實驗室主持人
中央研究院基因體中心合聘研究員

Director and Professor, Graduate Institute of Biomedical Electronics and Bioinformatics
Professor, Department of Electrical Engineering/ Department of Life Science/ Graduate Institute of Epidemiology and Preventive Medicine/ Genome and Systems Biology Degree Program, College of Life Science/ Graduate Institute of Oncology, National Taiwan University/ Taiwan International Graduate Program
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 Medicine
Joint Appointment Research Fellow / Genomics Research Center, Academia Sinica
Principal Investigator, Bioinformatics and Biostatistics Core Lab, NTU Center of Genomic Medicine

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。

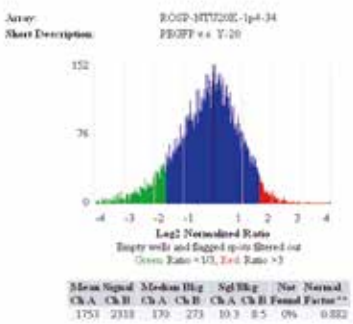
The focus of our laboratory is using genomic approaches to investigate the mechanisms of carcinogenesis. DNA microarray and Next-Generation Sequencing (NGS) have been applied widely in simultaneously monitoring a large quantity of gene expression patterns and served as a convenient, quick, and reliable 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

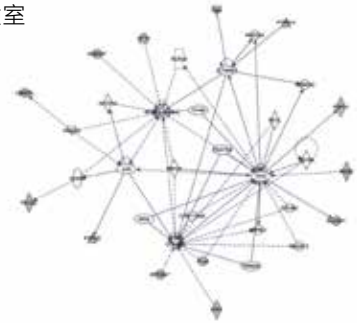
生物晶片、次世代定序、生物資訊、癌症生物、放射生物
Biochip, Next-Generation Sequencing, Bioinformatics, Cancer Biology, Radiation Biology

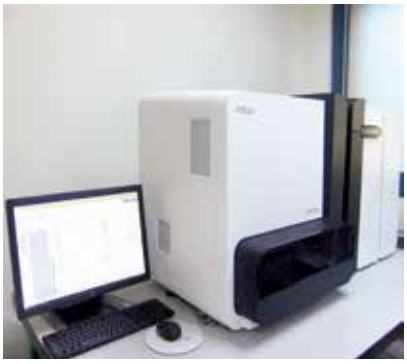
研究計畫 Research Projects

1. 華人乳癌基因資料庫及個人化雲端諮詢平台(財團法人永齡健康基金會)
   Chinese breast cancer genome database and personalized online consulting system
2. 癌症藥物基因體研究(財團法人資訊工業策進會)
3. Pharmacogenomics Research in Cancer臺灣特有雉科-藍腹鷴基因體定序計畫(臺北市立動物園)
   Taiwan endemic species-Lophura swinhoii sequencing project
4. 利用整合性基因群分析與舊藥新用策略尋找各乳癌亞型之最佳治療藥物(財團法人國家衛生研究院)
   Utilize Gene Set Analysis to Reposition Putative Drugs for Breast Cancer with ModulatedResponses



5. 優勢重點領域拔尖計畫 - 基因體醫學研究中心 - 生物資訊暨生物統計核心實驗室(邁向頂尖大學計畫)
   Bioinformatics and Biostatistics Core Facility
6. 研究 SEMA6A 在肺癌所扮演的角色及探討其基因多型性在台灣地區非吸菸女性肺癌的重要性(科技部)
   To investigate the roles of SEMA6A in lung tumorigenesis andsusceptibility-associated SNPs of SEMA6A in non-smoking female lung cancer
7. 探討Semaphorin 6A引發之免疫效果及其在肺癌免疫療法上之應用
   Characterization of SEMA6A-derived immunity and its potential applications of immunotherapy in lung cancer





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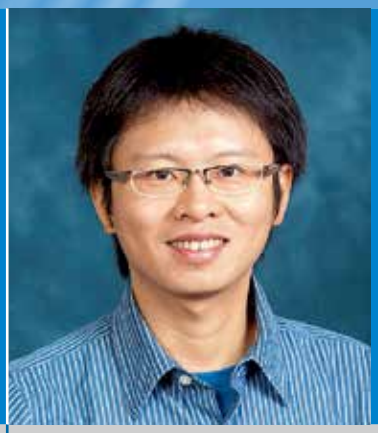

黃念祖 助理教授

Nien-Tsu Huang, Assistant Professor

國立臺灣大學生醫電子與資訊學研究所助理教授
國立臺灣大學電機工程學系助理教授

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

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

光微流道系統, 微系統細胞操控, 集中型表面電漿共振, 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. Determining mechanical and chemical stimulation responses of primary cilia with an integrated microfluidics-superresolution platform
   研發整合微流道系統之超高解析度顯微鏡進行細胞主纖毛之力學與化學刺激反應研究sponsored by
   國立臺灣大學與中央研究院,
   N.T.$ 1,800,000 2017/01/01-2018/12/31

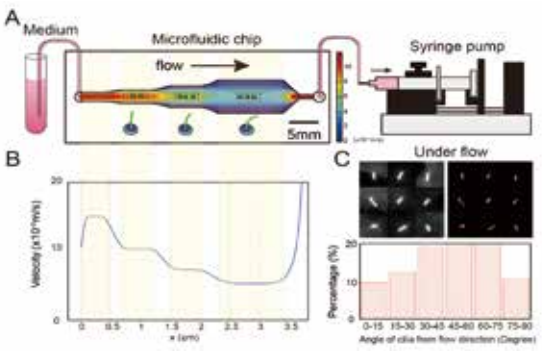

Fig. 1 The microfluidic platform to observe cilia mechano-response under various flow conditions

2. Developing a microfluidic cell trapping platform integrated localized surface plasmon resonance sensing for dynamic and multiplex cellular immunophenotyping monitoring
整合侷限型表面電漿共振感測及微流道細胞捕捉晶片進行動態多重免疫細胞表型分析, sponsored by 科技部 (Ministry of Science and Technology), 104-2221-E-002-205-, N.T.$ 857,000 2016/08/01-2017/07/31

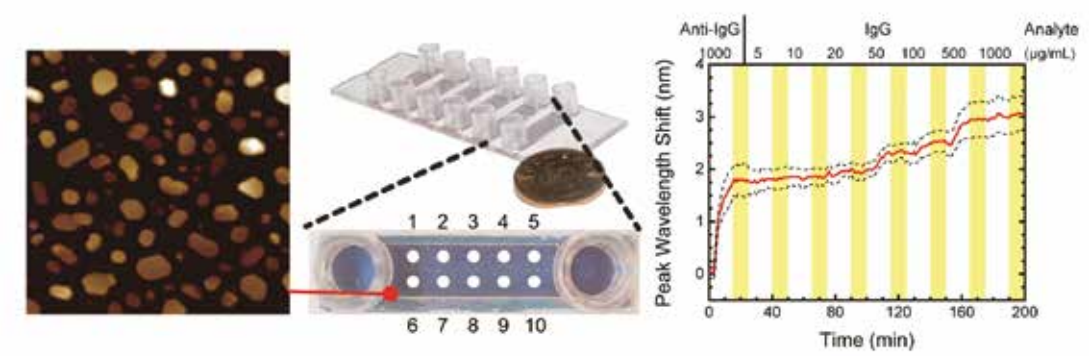

Figure 2 The large-are nanoplasmonic sensor for a paid and multi-parallel immunoglobulin detection

3. Developing an integrated DNA microarray-based microfluidic platform for rapid genetic mutation screening in patients with congenital long QT syndrome長Q-T間期症候群病人基因突變快速篩檢之微流道系統研發, sponsored by 科技部 (Ministry of Science and Technology),104-2221-E-002-205-, N.T.$ 839,000, 2015/08/01-2016/07/31

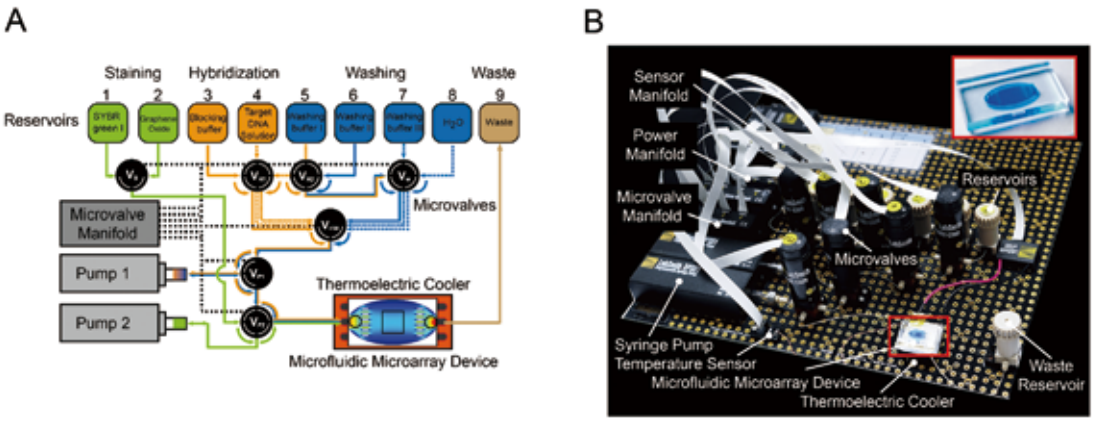

Figure 3 (A) The schematic and (B) The photo of AMDM platform for SNP detection of LQTS clinical sample

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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6名，碩士班研究生3名。博士班畢業生29名，碩士班畢業生21名。

Founded in July 2000. Supervisor: Prof. Hsiao-Wen Chung. This lab currentlyhas 6 Ph.D. students and 3 M.S. student, plus 29 Ph.D. graduates and 21 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. 數據分享式螺旋槳多b值擴散磁振造影

   Data sharing Propeller diffusion MR imaging with multiple b-values

   補助單位：行政院科技部工程司

   計畫期間：2015/8/1 ~ 2018/7/31

2. 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

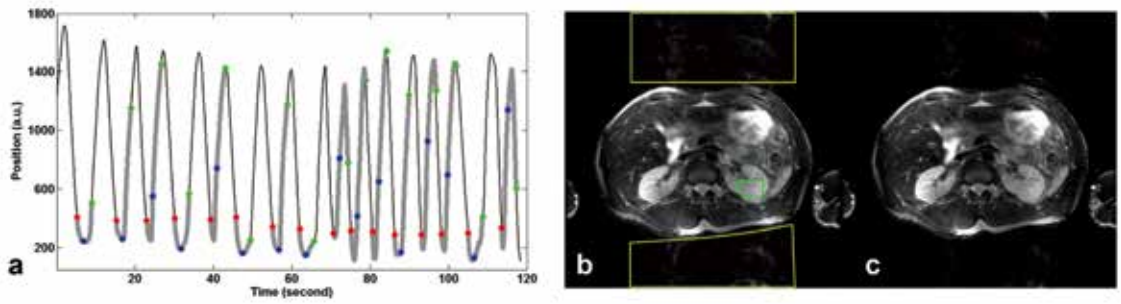
   補助單位：行政院科技部工程司

   計畫期間：2016/8/1 ~ 2019/7/31

■ 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 andgreen dots representing trigger points of three different slices. (b) and (c) are representative images of one slice reconstructed with 2D Fourier transform andan iterative methoddeveloped in our laboratory, respectively.



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管傑雄 教授

Chieh-Hsiung Kuan, Professor

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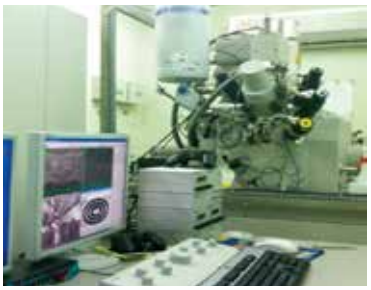
國立臺灣大學電子工程學研究所教授
國立臺灣大學電機工程學系教授

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.)

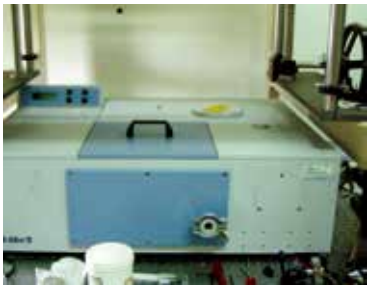


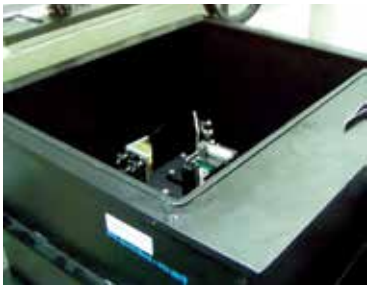
Focus Ion Beam -FIB,聚焦離子束設備

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)

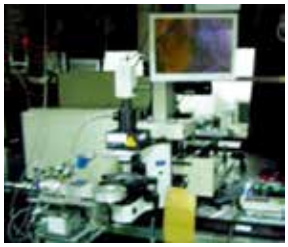




Bruker FTIR 紅外線光譜儀及變角度反射模組

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、量子點元件、電子元件雜訊分析、光學模擬、聚焦離子束系統

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

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

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Po-Ling Kuo, Associate Professor

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國立臺灣大學電機工程學系副教授
國立臺灣大學醫學院副教授
附設醫院復健部主治醫師

Associate Professor, Graduate Institute of Biomedical Electronics and Bioinformatic/ Department of Electrical Engineering, College of Medicine, National Taiwan University
Attending Physician, Departmet of Physical Medicine and Rehabition, National Taiwan University Hospital

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

- 壓力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
- 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

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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:

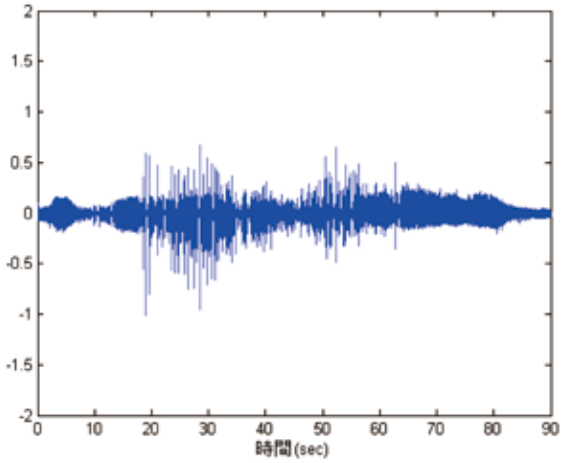
Analysis and Processing of Joint Vibration Signals for the Diagnosis of Cartilage Pathology

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

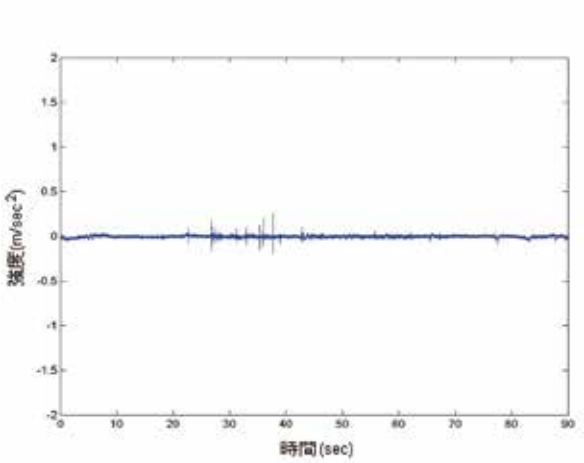
(2) Signal Processing Techniques for Vibration Signals of Equine Knee Joints

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

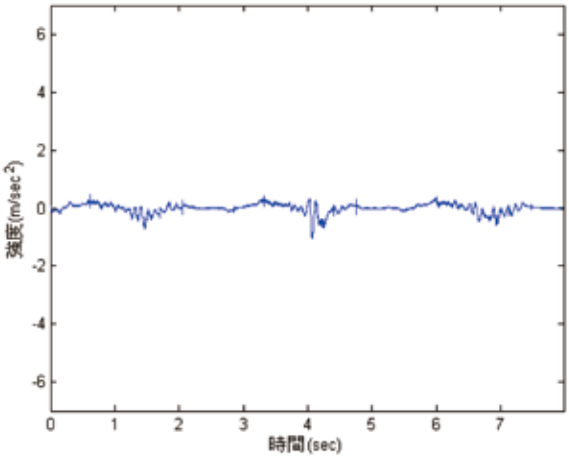
Goal of this research: To conduct research on Vibration Arthrometry (VAM) and provide the public a noninvasive, accurate tool (Expert Systems) for the diagnosis of joint disorders in clinical medicine.



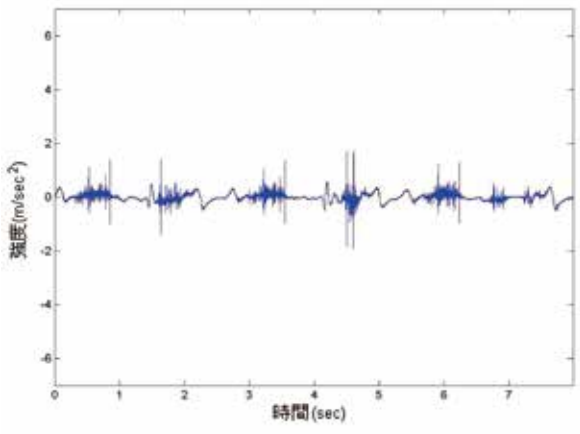
(A) 正常著膝關節在慢速擺動下所產生的振動訊號
(Physiological Patellofemoral Crepitus; PPC)



(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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紅外線元件實驗室

IR Device Laboratory

本實驗室開發之多波段熱輻射紅外光源(圖一)，俱有偏極化、窄頻寬、可調變多波長之特性。窄頻紅外光源成功地應用在觀察紅外光對植物生長基因表現，和影響癌細胞生長變化的研究。善用窄頻紅外光源，我們可研究動植物細胞持續受到特定波段紅外光照射時，其成長型態、基因表現，以及所有蛋白質表現的增減變化。近期已將窄頻多波長紅外光源應用於氣體(酒精)偵測系統(圖二)，成功達成不同濃度酒精之雙波長偵測(圖三)。

研究成果發現4~5 μm紅外光照射大腸桿菌24小時，可刺激外膜蛋白(OmpA , OmpF)表現量，增強新陳代謝和菌落生長，結果如同圖四所示。阿拉伯芥經過3~5 μm 窄頻紅外光照射72小時後，分析GASA4、CHS、RbcS、NPQ4和PSAK基因，發現不同波段窄頻紅外光可影響生長型態和基因表現。照射3~5 μm寬頻紅外光48小時的肺腺癌細胞A549，生長受到明顯抑制，細胞明顯膨大和停滯於細胞週期G2與M，結果如同圖五所示。 3~5 μm窄頻紅外光照射子宮頸癌細胞HeLa 48小時，可破壞粒線體膜電位和增加細胞凋亡，加強化療藥物 Paclitaxel的療效。

Our lab has developed the multi-wavelength thermal emitter with narrow bandwidth, polarization, tunable wavelength characteristics, as shown in Fig. 1. It has been applied to investigate the effects of IR radiation on plant growth and cancer cell physiology. Furthermore, narrow band IR emitters can be used to compare growth morphology, gene and protein expression under specific wavelengths of IR radiation. The IR light source was also applied in a NDIR gas (alcohol) detection system, as shown in Fig. 2. Dual-wavelength detection of different concentrations of alcohol has been successfully achieved, as shown in Fig. 3.

Recently,we found that 4~5μm IR radiation for 24 hours increased up-expression of membraneproteins (OmpA,OmpF) and growth rates of E. coli colony as shown in Fig. 2. In addition, we found that 3~5μm IR radiation for 72 hours regulated morphology and the genes expression of Arabidopsis, such as the GASA4, CHS, RbcS, NPQ4 and PSAK genes. The 3~5 □m IR radiation can induce cell dilation and G2 /M cell cycle arrest in lung cancer A549 cells at 48 houras shown in Fig. 3. Moreover,we found that the narrow band infrared radiation with peak wavelengths of 3, 4, and 5 □m for 48 hours can damage mitochondrial membrane potential and cellular apoptosis to enhance the effectiveness of paclitaxel treatment on cervical cancer HeLa cells.

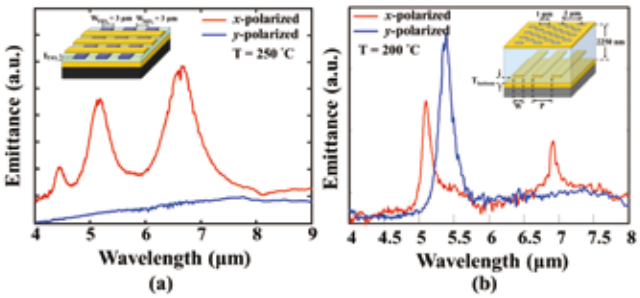

圖1 多波長且具偏極化特性之(a)侷域電漿子型和(b)波導型窄頻熱輻射紅外光發射器與其發光頻譜

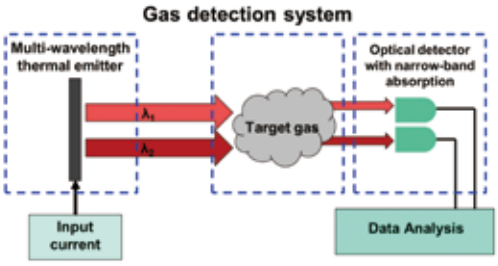

圖2 氣體(酒精)偵測系統結構示意圖

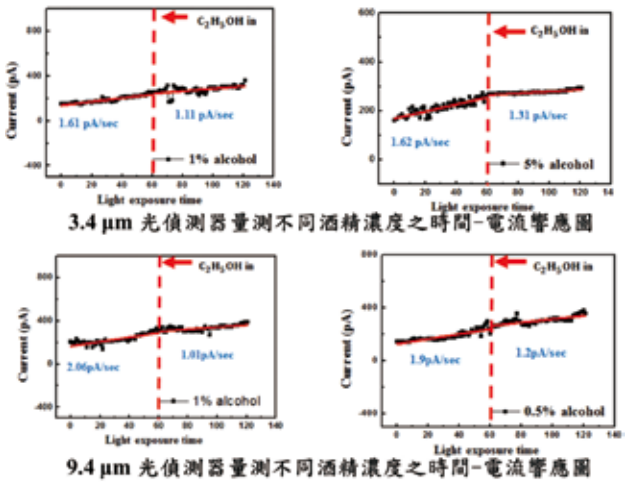

圖3 氣體偵測系統對待測目標物(酒精)所得之量測結果

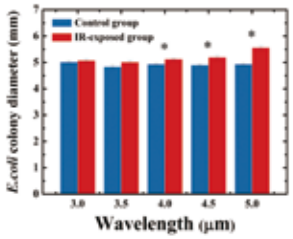

圖4 大腸桿菌照射紅外光24小時之菌落分析

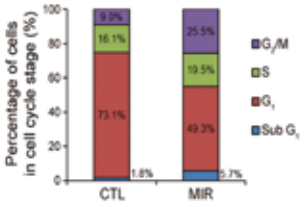

圖5 肺癌細胞A549照射紅外光48小時之細胞週期分佈結果

1. Paclitaxel(紫杉醇)可阻斷細胞週期G2與M，聚合和穩定細胞內微管，讓腫瘤細胞在有絲分裂階段被固定住，生長過程受阻斷而凋亡。窄頻波導型熱輻射發射器可發出窄頻紅外光3,4,5 μm破壞子宮頸癌細胞的粒線體膜電位，進而提升Paclitaxel對子宮頸癌細胞HeLa的治療效果。
2. 3~5 μm寬頻紅外光會造成肺癌細胞A549在細胞週期G_2/M 停滯和雙股DNA的斷裂，若我們在照光前，使用抗氧化劑NAC 一小時，可消除紅外光造成的雙股DNA斷裂。
3. 窄頻表面電漿子熱輻射發射器照射阿拉伯芥72小時，不同波段的窄頻紅外光可影響*GASA4*、*CHS*、*RbcS*、*NPQ4*和*PSAK*基因表現。
4. 4~5μm紅外光照射大腸桿菌24小時，可增強生長代謝，和刺激外膜蛋白(*OmpA*, *OmpF*)表現量。

研究計畫 Research Projects

1. 前瞻技術產學合作計畫-7-5nm半導體技術節點研究(45)
   Pathfinding for 7–5nm Semiconductor Technology Nodes

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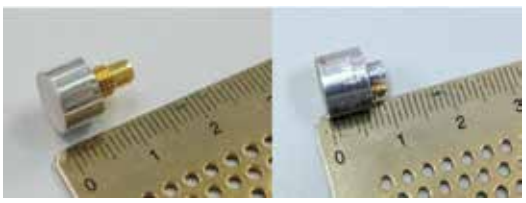
Associate Dean, College of Electrical Engineering and Computer Science
Distinguished Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Adjunct PI, National Health Research Institutes

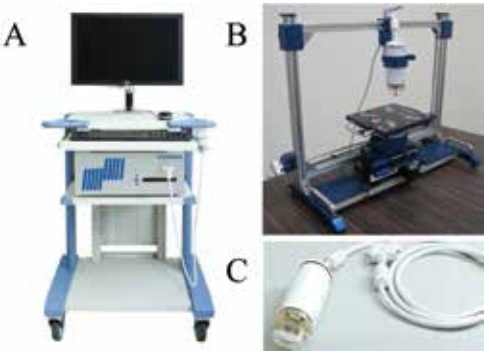
超音波影像實驗室

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

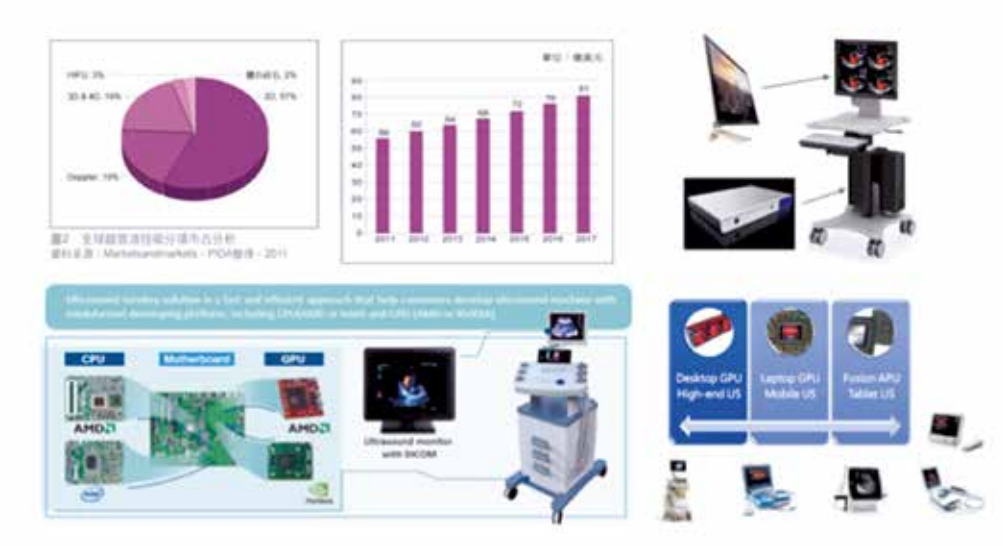
生物醫學工程、超音波影像、生醫光聲影像

Biomedical Engineering, Ultrasound Imaging, Biomedical Photoacoustics

研究計畫 Research Projects

1. 自動化三維超音波乳房影像檢查
   Automatic 3D ultrasound breast screening
2. 剪力波斷層掃描影像儀技術創新與治療應用(重點主題C3)總計畫兼子計畫-斷層掃描式剪力波影像技術開發與系統實現
   Technology development and system implementation of shear wavecomputed tomography
3. 光學式彈性成像技術開發與三維細胞研究應用
   Optical Shear Wave Elasticity Imaging and Applications to 3D CellStudies
4. 高階診斷超音波系統商品化與事業化計畫
   Development and integration of high-end diagnostic ultrasound systems
5. 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

■ **研究計畫** - 高階診斷超音波系統商品化與事業化計畫Development and integration of high-end diagnostic ultrasound systems之代表圖及說明：



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

內皮細胞分子生物學實驗室

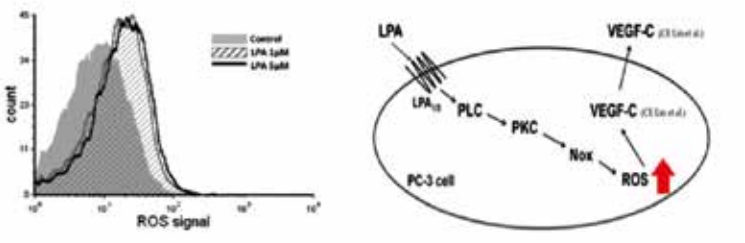
Laboratory of Endothelial Cell Molecular Biology

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.

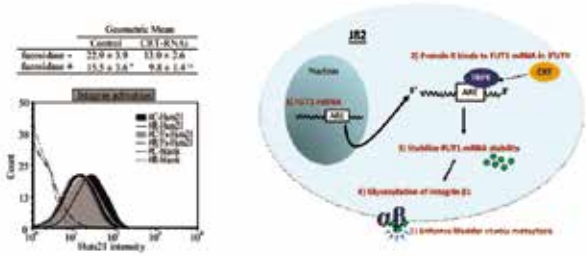
■ 右圖說明：

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



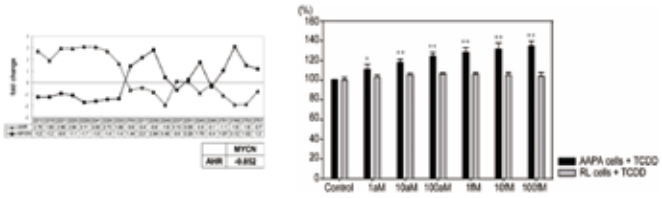
Research on Cancer cell biology

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

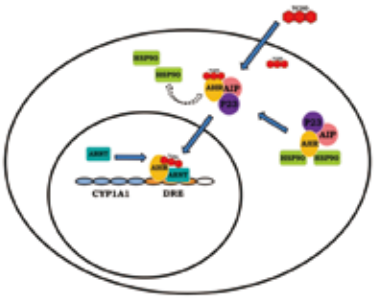


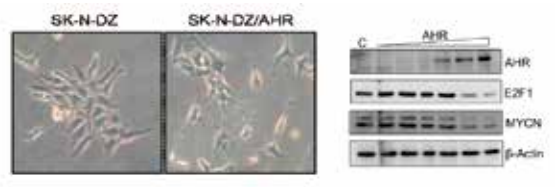
■ **右圖說明：**

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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Chih-Ting Lin, Professor

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生醫晶片技術實驗室

CMOS Biotechnology Lab.

本實驗室成立於2006年，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，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. 有機電子噴墨技術與標準半導體電子製程技術整合之異質三維系統晶片架構之研發 (NSC 101-2628-E-002-022-MY3)
2. 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)
3. 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)

■ **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。

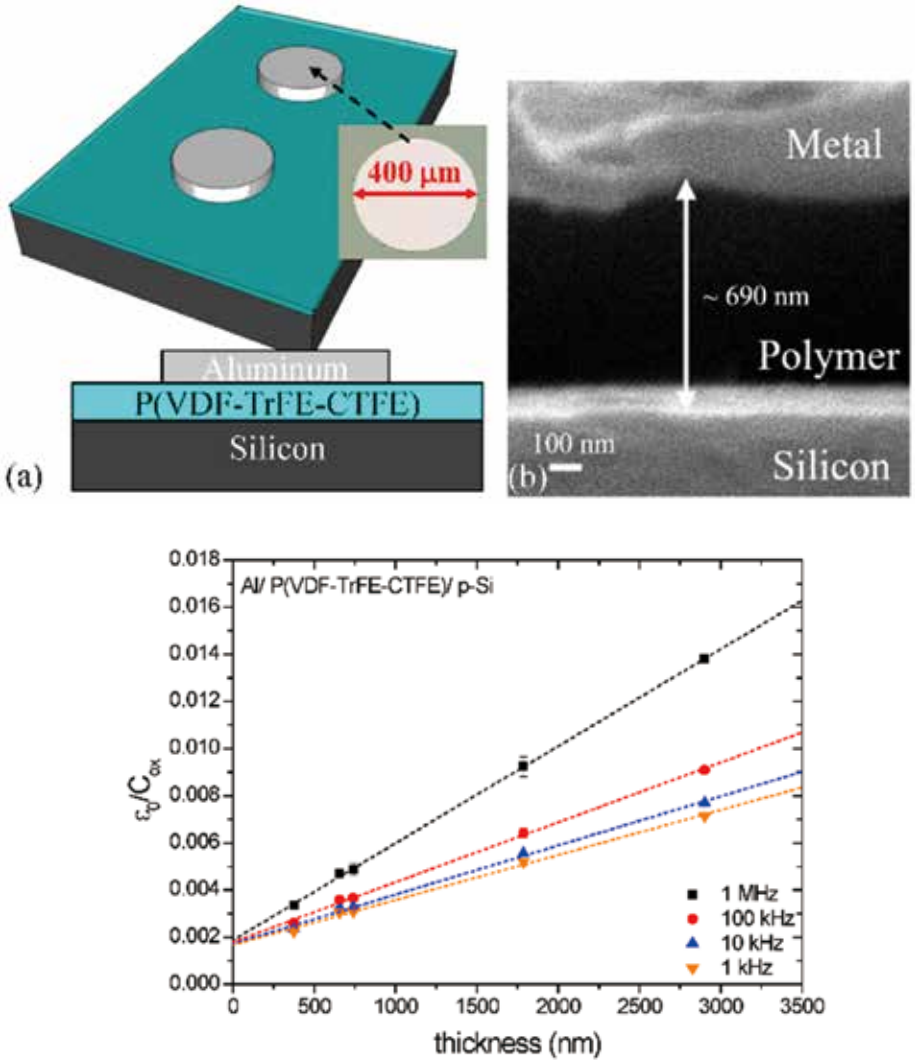
Project title: The development of inkjet printable devices based on P(VDF-TrFECTFE)

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

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國立臺灣大學醫學工程研究所教授
國立臺灣大學電機工程學系教授

Professor, Graduate Institute of Biomedical Electronics and Bioinformatics/
Graduate Institute 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. 針對大腸腫瘤及淋巴结轉移的早期發現和清除的光電醫學診斷與治療關鍵問題研究102-2218-E-002 -014 -MY3
2. 無線充電高頻脈衝電刺激貼片於腕隧道症候群之應用研發 102-2320-B-002 -040 -MY2
3. 國立臺灣大學萌芽創業推廣計畫-拋棄式表面電漿子共振晶片原型開發與前臨床驗證 103-2812-8-002-003-
4. 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MOST 105-2221-E-002 -016 -MY3

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Fa-Hsuan Lin, Professor

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國立臺灣大學生醫電子與資訊學研究所教授
國立臺灣大學腦與心智科學研究所教授
國立臺灣大學醫學院醫學系放射線科教授

Professor, Institute of Biomedical Engineering, National Taiwan University
Professor, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
Professor, Graduate Institute of Brain and Mind Sciences, National Taiwan University
Professor, Department of Radiology, School of Medicine, National Taiwan University

人腦實驗室
Lab of Brain Imaging and Modeling

近年來, 科學界逐漸了解複雜的人類行為與認知功能是藉由腦中不同階層的神經系統交互作用所表現出來, 而非由單一的結構所掌控, 有鑑於此, 欲進一步了解人腦功能, 則需要在結構與功能層面上研究以下三個問題: (1)什麼地方發生活動(2)這些活動是何時發生以及其發生順序為何(3) 是如何藉由在大規模的神經網路中的訊息傳遞完成這些認知行為。現代非侵入性的醫學影像技術可幫助我們獲得高空間與時間解析度的神經活動資料, 而定量的系統模擬將有助於解譯隱含於這些神經影像資料中協同完成感官, 認知, 與行為歷程的動態神經活動.

本實驗室的研究方向為整合硬體研發, 資料分析, 與數值模擬等工程技術來幫助我們了解複雜的人腦功能. 進行中的研究計畫集中於結合結構與功能性核磁共振影像, 腦磁圖與腦電圖之高時間空間解析度的神經影像技術, 以及系統階層的神經信號模擬. 以了解神經活動與行為間的關係.

Complex behavior and cognitive functions of the human brain are suggested to be "mapped at the level of multi-focal neural systems rather than specific anatomical sites, giving rise to brain-behavior relationships that are both localized and distributed". Further understanding of these brain mechanisms requires both structural and functional knowledge to answer (i) where are the foci of activity, (ii) when are these areas activated and what is the temporal sequence of activations, and (iii) how does the information flow in the large-scale neural network during the execution of cognitive and/or behavioral tasks. Advanced noninvasive medical imaging/recording modalities are able to localize brain activities at high spatial and temporal resolution. Quantitative modeling to interpret these data is needed to understand how large-scale distributed neuronal interactions underlying perceptual / cognitive / behavioral functions emerge and change over time.

Our research interests include the integration of hardware development, data analysis, and mathematical modeling to facilitate our understanding of brain cognition. Current research projects try to explore challenges of spatiotemporal brain imaging and modeling by using a combination of hardware and analytical approaches to enhance the spatiotemporal resolution of single (MRI) or combined (MRI/fMRI and MEG/EEG) modalities. In addition, mathematical approaches for identifying large-scale neural networks and their correlation to behavioral measurements are investigated.

主要研究領域 Major Research Areas

神經影像、核磁共振影像、腦磁圖、腦電圖、神經系統模擬

Neural imaging, Magnetic resonance imaging, Magnetoencephalography (MEG), Electroencephalography (EEG), Neuronal modeling

研究計畫 Research Projects

1. 科技部計畫 -【利用超快速功能性核磁共振影像技術於人腦神經血液動力耦合之研究】
   Human neuro-vascular coupling revealed by ultra-fast functional magnetic resonance imaging method
2. 科技部計畫 -【人腦γ-氨基丁酸與麩胺酸核磁共振頻譜與頻譜影像診斷系統(重點主題:C3)--總計畫兼子計畫一：高敏感度多通道核磁共振頻譜與頻譜影像偵測與校正系統】
   Development of field probes and shim coil system for magnetic resonance spectroscopy and spectroscopic imaging

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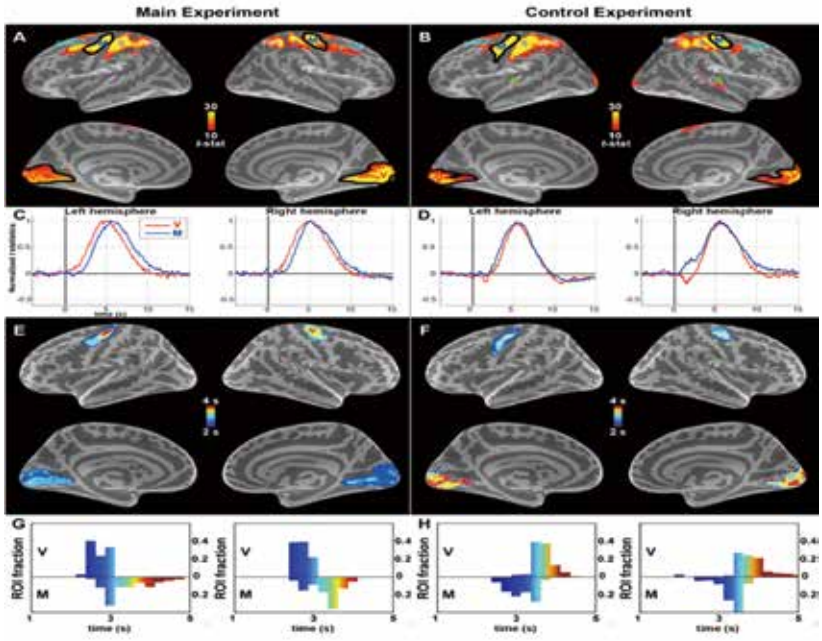
■ **研究計畫** - 利用超快速功能性核磁共振影像技術於人腦神經血液動力耦合之研究
Human neuro-vascular coupling revealed by ultra-fast functional magnetic resonance imaging method之代表圖及中英文說明：



(A) During the main (visuomotor) experiment, both visual (V) and motor (M) cortices were activated. The black outlines indicate the ROIs thresholded from these statistical images. PPC: posterior parietal cortex; S: somatosensory cortex; preM: premotor cortex (B) During the control (motor-visual) task, V and M cortices were activated. Again, the black outlines indicate the ROIs; these were over 80% overlapping with the main experiment ROIs in panel A. PPC: posterior parietal cortex; S: somatosensory cortex; preM: premotor cortex (C–D) The corresponding ROI-specific BOLD responses (peak amplitudes normalized across ROIs, group level). The order of activations clearly follows the order of external events (stimuli and task). The signal-to-noise ratio across all ROIs was 29. (E – F) Spatial distribution of latencies (TTH) within the visual and motor ROIs. Variability within ROIs was much smaller than delays across ROIs, suggesting that voxel-to-voxel variability did not confound the results. (G – H) Histograms of latencies (TTH) within the visual and motor ROIs.

(A)與(C)：在主要實驗中, 受試者在從事視覺-運動作業下會引發位於視覺區與感覺運動區的血氧信號。利用100毫秒解析度INI重建之功能性核磁共振影像(fMRI)技術，可發現位於左腦與右腦的群體視覺區活動先於感覺運動區。(B)與(D)：而進行另一項控制實驗(先手部運動後視覺刺激)時，位於視覺區與感覺運動區的血氧信號順序則會與主要實驗相反：感覺運動區的血氧信號會早於視覺區數百毫秒。(E)與(F)二圖顯示此二腦區的血氧信號到達50%最大強度的時間點之空間分佈圖。(G)與(H)：視覺區與感覺運動區的血氧信號到達50%最大強度的時間點之直方圖。

孫啟光 教授
Chi-Kuang Sun , Distinguished Professor

國立臺灣大學生醫分子影像研究中心 核心實驗室召集人
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
中央研究院物理研究所 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.
Adjunct Research Fellow, Institute of Physics, 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。

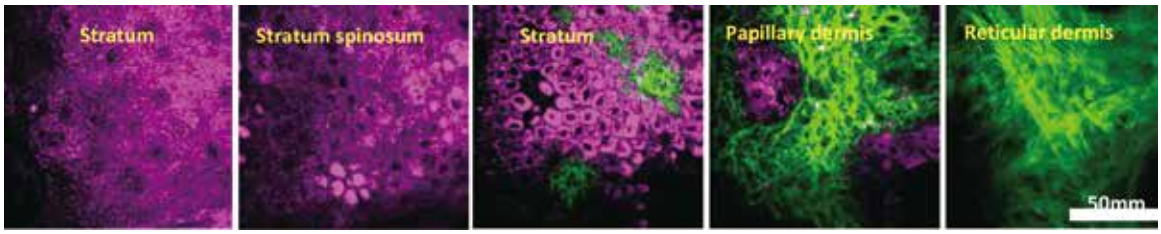
主要研究領域 Major Research Areas

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. 頻譜解析三倍頻顯微術 (3/3):科技部
   Spectrally-resolved Third Harmonic Generation Microscopy
2. 阿茲海默症多尺度跨領域之研究-建構先進非線性光學顯微術以從事小鼠全腦腦連結體影像:國立台灣大學
   Volumetric deep-tissue imaging of connectomes in intact whole mouse brains by developing advanced nonlinear microscopy
3. 以光學方式觀察神經痛小鼠及病人的傷害性神經變化(1/4): 科技部
   Visualize nociceptor changes in neuropathic mice and human patients

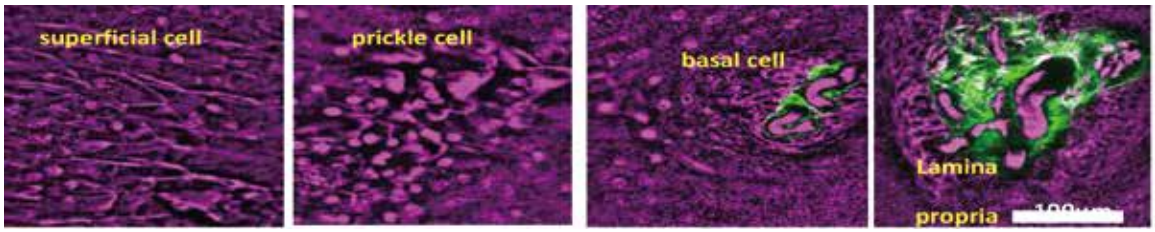
■ 代表圖及中英文說明-1：



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。

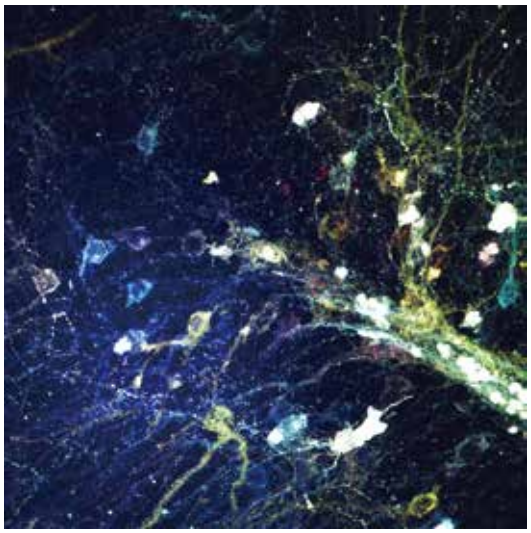
■ 代表圖及中英文說明-2：



In *vivo* HGM images of human oral mucosa

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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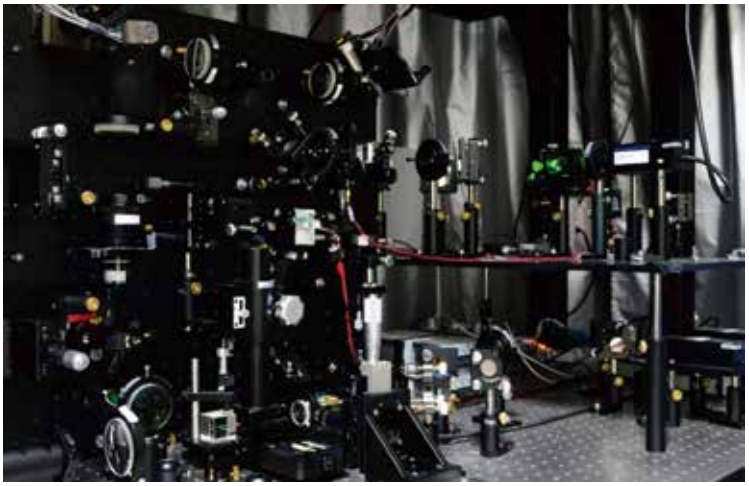
生醫光譜與影像實驗室

Biomedical Optical Spectroscopy and Imaging Lab.

我們實驗室目前的研究重點是以光學方法來觀察生物組織、細胞與分子，主要分為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的工具，協助疾病如上皮癌前病變之診斷，以及生理狀況的長期監測。

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 tools for diagnosing disease such as epithelial precancers and monitoring physiological status.



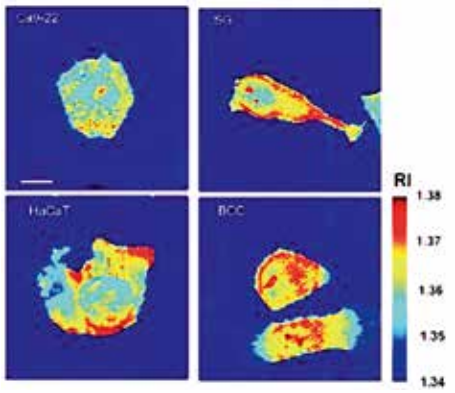
主要研究領域 Major Research Areas

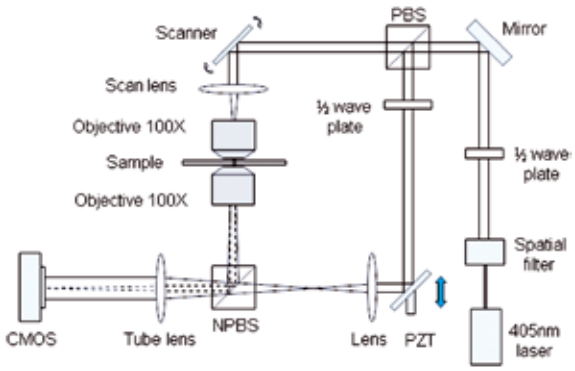
生醫光電、生醫工程
Biomedical Optics, Biomedical engineering

研究計畫 Research Projects

1. 以光學虛擬切片分子影像從事早期疾病診斷(共同主持人)
   Advanced Optical Virtual Biopsy for Early Disease Diagnosis (co-PI)
2. 三維折射率活細胞顯微術(主持人)
   Three-dimensional refractive-index microscopy for live cell imaging (PI)
3. 非侵入性高光譜顯微影像系統進行食道癌域理論之光學定量分析(共同主持人)
   Optical quantification of field carcinogenesis in the esophagus with a non-invasivehyperspectral imaging system (co-PI)
4. 針對大腸腫瘤及淋巴结轉移的早期發現和清除的光電醫學診斷與治療關鍵問題研究(共同主持人)
   Integrated optoelectronic approaches for early diagnosis and precision treatment of metastasis colorectal cancer and lymph node (co-PI)
5. 創新非侵入式中央靜脈血氧飽和濃度儀(共同主持人)
   Innovation and noninvasive central venous oximetry (co-PI)
6. 以背向散射光譜進行活體白血球計數(主持人)
   In vivo White Blood Cell Count with Backscattering Spectroscopy(PI)
7. 手持式偵測皮膚組成系統之開發(主持人)

■ **研究計畫** - 三維折射率活細胞顯微術 (Three-dimensional refractive-index microscopy for live cell imaging, Supported by: Ministry of Science and Technology) 之代表圖及中英文說明：





上圖為本計畫所建構的光學相位斷層掃描系統，利用此系統可以得到細胞的三維折射率的分布，下圖為四種不同細胞株(CA9-22, BCC, HaCaT及SG)於聚焦平面之折射率分布。圖中白色線代表10 μm。

The figure at the top shows a schematic diagram of an optical tomographic phase microscope developed in this project. We have used this novel technique to acquire three-dimensional distributions of refractive index of living cells. The four figures at the bottom show refractive index images of four cell lines at the focal plane.

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臨床磁振影像實驗室

Clinical Magnetic Resonance Imaging Lab.

本實驗室由吳文超教授成立於2010年，主要從事磁共振影像技術開發與臨床應用之相關研究，目前以微灌流影像與功能性影像為研究重點，並與台大醫院影像醫學部、神經部、核子醫學部合作，建立多模技術平台，提高於臨床診斷及預後的準確性。

Professor Wen-Chau Wu founded the Laboratory for Clinical Magnetic Resonance Imaging in the summer of 2010. The main research focus has been placed on the technical development and clinical applications of magnetic resonance imaging (MRI). Currently, we are conducting two NSC funded projects using advanced MRI techniques, including multi-modal functional MRI, perfusion MRI (arterial spin labeling, dynamic susceptibility contrast enhanced imaging, and dynamic contrast enhanced imaging), and diffusion-weighted MRI. We closely collaborate with the Departments of Medical Imaging, Neurology, and Nuclear Medicine in National Taiwan University Hospital to build up a multi-modal framework to improve the accuracy of diagnosis and prognosis in various diseases.

主要研究領域 Major Research Areas

微灌流磁共振影像、功能性磁共振影像、醫學影像處理、生醫信號分析
Perfusion Magnetic Resonance Imaging (Arterial Spin Labeling and Contrast-Material-Based Methods), Functional Magnetic Resonance Imaging, Medical Image Processing, Biomedical Signal Analysis

研究計畫 Research Projects

1. 以動脈氫質子標記磁振造影整合性評估血管狹塞疾病之腦部灌流
   Integrative assessment of cerebral perfusion in stenoocclusive disease using arterial spin-labeling magnetic resonance imaging
2. 以進階磁振影像參數診斷腦瘤：延伸擴散影像與對比劑灌流影像之結合與比較
   Diagnosis of brain tumors using advanced magnetic resonance imaging parameters – combination and comparison of extended diffusion imaging and contrast-material-based perfusion imaging

研究計畫 Research Projects

1. 以動脈氫質子標記磁振造影整合性評估血管狹塞疾病之腦部灌流
   Integrative assessment of cerebral perfusion in stenoocclusive disease using arterial spin-labeling magnetic resonance imaging
2. 以進階磁振影像參數診斷腦瘤：延伸擴散影像與對比劑灌流影像之結合與比較
   Diagnosis of brain tumors using advanced magnetic resonance imaging parameters – combination and comparison of extended diffusion imaging and contrast-material-based perfusion imaging

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Pan-Chyr Yang, Distinguished Professor

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中央研究院院士

Distinguished Professor, Graduate Institute of Biomedical Electronics and Bioinformatics
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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 cancerpatients. 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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Convener m of Organ Procurement Organization, National Taiwan University Hospital

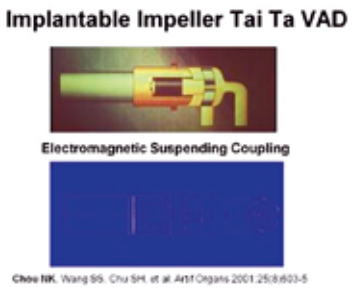
臺大醫院第七共同研究室

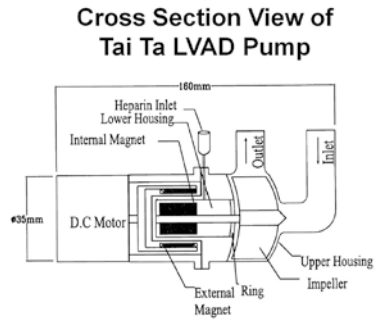
Laboratory.

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

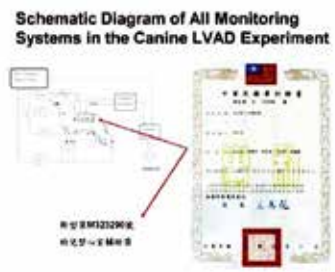
1. 小動物實驗模型
2. 醫療儀器、訊號分析處理
3. 超音波影像處理
4. 實驗室儀器：雙向心臟血管用X光射影系統、多頻道生理記錄分析系統(Polygraphy)、Injector、Autoinjector、多頻道心理生理電腦化記錄分析儀(EP recording)、CARTO、電氣生理刺激器、血管內導線壓力儀器(PressureWire)、OCT、電燒機、血管內超音波(i-LAB)、血液凝固測試儀(ACT)、波士頓科技羅塔培特控制台系統、IABP、電擊器、血中含氧測定儀、非侵入式自動血壓計、微量點滴控制器(Syringe pump)、人工心律調整器、血氧飽合濃度監視器、血壓血氧ECG監視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

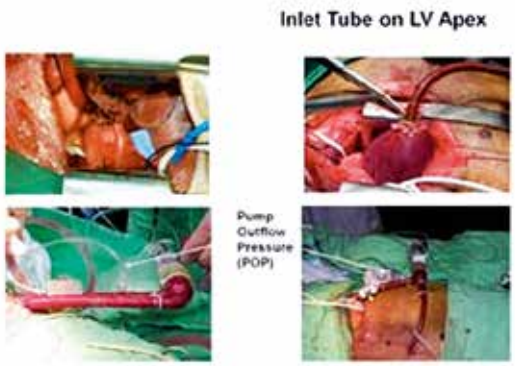
Laboratory animals, animal models of heart failure and artherosclerosis, establishes computerized database for laboratory animal science and assists in various experiments, disease diagnosis, and health monitoring.





Chou NK, Wang SS, Chu SH, et al: Artif Organs 2001;25(8)603-5





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生醫系統工程實驗室

Biomedical System Engineering Lab.

線粒體是細胞的能量工廠，線粒體也在細胞中扮演了其他重要的角色，例如調節細胞凋亡與維持離子平衡。也因此線粒體功能與許多重要的疾病與生理現象有密切的關係，像是心臟疾病、神經退化疾病、糖尿病、癌症以及多種代謝疾病都與線粒體的功能都有關聯。

本實驗室的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，提供線粒體如何影響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。開發線粒體模型，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

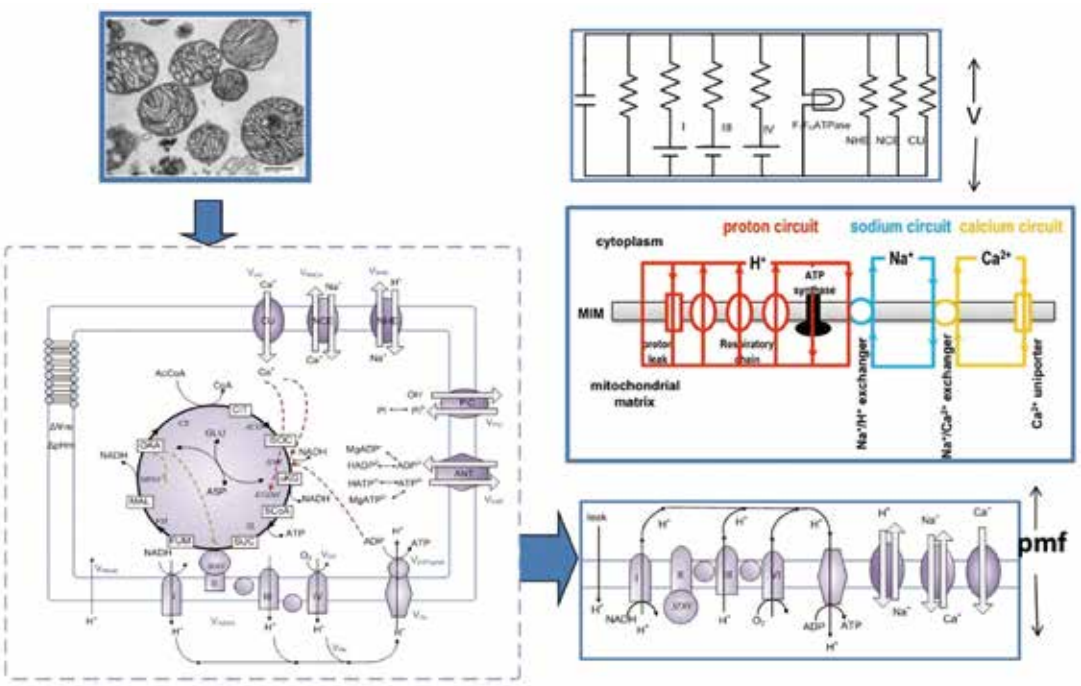
Mitochondria, bioenergetics and metabolism, systems biology, modeling and simulation of biological systems

研究計畫 Research Projects

1.【研發細胞線粒體的計算模型】

Developing mitochondrial computational model in the cell to elucidate the interplay between ion balance, mitochondrial energy state, and redox status

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。



圖一 線粒體系統和電路模型之類比

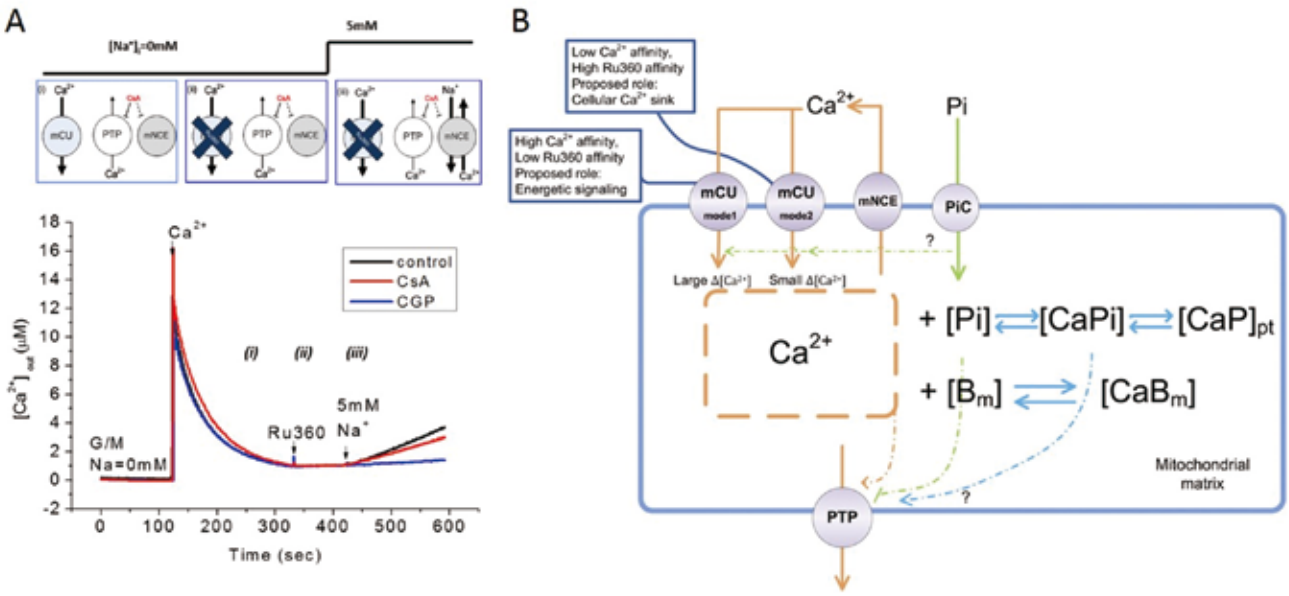
Figure 1.

Mitochondrial ion circuit as an analog of an electrical circuit:By making analogies between the complex mitochondrial system and a simple electrical circuit model, we will have a better understanding of the interactions between ion dynamics and energetics in a unique and intuitive manner.

2.【心肌細胞線粒體鈣離子調節之研究】

Study of mitochondrial calcium regulation in cardiac myocytes

研究線心肌細胞粒體鈣離子處理和緩衝。



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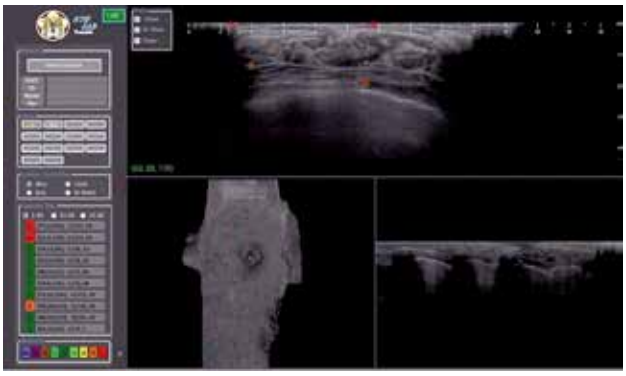
醫學影像處理實驗室

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 outearlier, 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 systemshave higher accuracy, the demand of the breast biopsy can be reduced. Since 1998, we are devoted to develop theultrasound (US) CAD systems including 2D/3D US, color Doppler US, color elastography, PC-based US, and automatedUS. The laboratory also collaborates with The University of Chicago and U-systems Inc., USA. We closely collaboratewith physicians from Seoul National University Hospital, Dokkyo Medical University Hospital, National TaiwanUniversity Hospital, and Taipei VeteransGeneral Hospital.



代表圖及中英文說明：
Automated Breast Ultrasound / 全自動乳房超音波

主要研究領域 Major Research Areas

醫學影像電腦輔助診斷、影像視訊處理、多媒體系統及通訊

Medical Image Computer Aided Diagnosis, Image Processing, Multimedia Systems and Communication

研究計畫 Research Projects

1. 新式乳房彈性超音波之電腦輔助診斷 / Computer-aided Diagnosis System for Advanced Breast Elastography
2. 自動乳房超音波之電腦輔助腫瘤偵測 / Computer-aided Tumor Detection System for Automated Breast Ultrasound

■ **研究計畫** - 自動乳房超音波之電腦輔助腫瘤偵測
補助單位：行政院科技部
計畫期間：2014/08/01 ~ 2017/07/31

自動乳房超音波是繼彩色Doppler 超音波及彈性超音波之後最重要的超音波新技術，自動超音波是利用自動掃瞄機構來移動探頭以取得全乳房超音波影像並儲存成電腦檔案，可如其他醫學影像將掃瞄及診斷工作分開，醫師並可隨時查詢任何部位的影像，其主要可避免徒手式超音波易有人為失誤及可進行大量快速篩檢。但自動超音波一個病例會掃出大量的影像，醫師仍需花費許多時間來診斷，因此利用電腦輔助腫瘤偵測是有其必用性。目前技術已可以找出腫瘤但主要問題在於降低偽陽數，如果偽陽數過多對於醫師的診斷助益並不高。而乳房腺體回音紋理類型分類是目前相當熱門的新主題，回音紋理類型主要可分成同質性或異質性，異質性回音紋理類型較同質性的女性有更高的罹患乳癌風險。本計畫將以西門子的ABVS影像及新式的iVu俯臥式旋轉ABTS影像為研究對象，發展電腦輔助偵測、診斷、密度分析、紋理類型分類系統，第一年將利用分水嶺偵測將腫瘤從大量的自動乳房超音波影像中找出，以提供診斷參考。第二年針對iVu旋轉式ABTS自動超音波腫瘤偵測及密度分析。第三年將發展偵測效能自動評估工具並利用乳房組織結構及整合多次掃瞄結果降低腫瘤偽陽率，同時研究自動超音波回音紋理類型，紋理類型在乳癌風險預測具有極大意義。

■ Project title: Computer-aided Tumor Detection System for Automated Breast Ultrasound
Supported by: Ministry of Science and Technology
Project period: 2014/08/01 ~ 2017/07/31

The automated breast ultrasound (ABUS) is the most important development in ultrasound technology since the advent of Doppler imaging and elastography. In the ABUS, there is a mechanism to automatically move a longer probe to obtain the whole breast ultrasound images. The images will be saved into a computer file and the physician could review the images at any locations of scanned breast. For the ABUS, the scanning and diagnosis could be separated as other modalities such as Mammography and MRI. It could avoid the disadvantages of conventional freehand ultrasound and be used in the fast breast mass screening. However, there are a lot images in an ABUS case and the physician still needs a lot of time to review the images. Hence, a computer-aided detection system is needed to reduce the diagnosis time and avoid the misdiagnosis. Although the current technology could detect the tumors easily, the main issue is how to reduce the number of false positives. A computer-aided detection system with high number of false positives still cannot help the doctors to reduce the diagnosis time. This project will focus on the Siemens ABVS images and the newest prone rotational iVu ABTS images to develop the computer-aided detection, diagnosis, density analysis, and echo texture type classification systems. In the first year, the watershed technique will be applied for finding the breast tumor in the ABUS images. In the second year, the computer-aided diagnosis and density analysis systems for the iVu rotational ABTS images will be developed. In the third year, an automatic detection evaluation tool will be developed to reduce the evaluation time and the breast structure and multi-pass detection results will be used to further to reduce the number of false positives. Also, the echo texture classification will be developed for the breast cancer risk factor.

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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

1. 大眾化配對問題的延伸研究及其演算法設計(104-2221-E-002-046-MY3)
2. 用於辨識布林網路特徵的新演算法(103-2221-E-002-157-MY3)

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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：光寶科技、源浩科技、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 Liteon, Egis Technology, Lumens Digital Optics, Delta Electronics, 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. 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
2. 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
3. 數位相機之影像處理: 降低雜訊, 光線補償, 臉色改善
   Image Processing for Digital Cameras: Noise Reduction, Light Compensation, Facial Color Enhancement

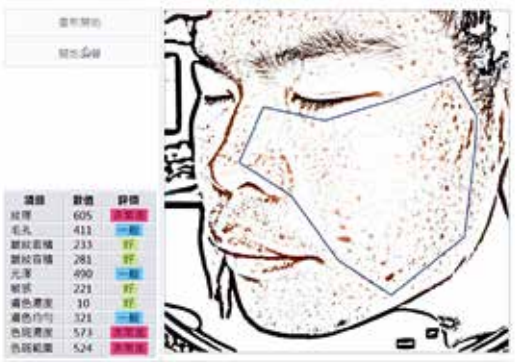
■ Project title: 3D Solder Shape Reconstruction and Defect Inspection with X-Ray Images: 2D Reconstruction, 3D Reconstruction, Computation Acceleration

Supported by: Ministry of Science and Techology

Project period: 2015/08/01 ~ 2018/07/31

This is a three-year project to use computer vision and digital image processing methods and X-ray images for 2D reconstruction, 3D reconstruction, defect inspection, and computation acceleration research. We will study the best X-ray camera, light source, environment, distance, angle, and solder ball reconstruction and defect inspection algorithms and computation acceleration. In the first year, we will research algorithms and programs for 2D reconstruction and defect inspection such as open circuit, short circuit, too small solder ball, insufficient solder, or too much solder. After 2D reconstruction, in the second year, we will research 3D reconstruction and defect inspection with different X-ray camera and light source distances and angles. We aim to inspect defects of multiple-layer ball grid array and circuit boards with package on package and land grid array. After 3D reconstruction and defect inspection, due to enormous computation, we will research to accelerate computation with graphical processing units or streaming SIMD extension 4 instruction set. We aim to break Japanese and German patent and technology barriers in these three aspects and enhance Taiwan's international competitiveness and market shares on semiconductor inspection equipment such as AOI, AXI, and SPI.

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



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主要研究領域 Major Research Areas

乳房外科、乳房超音波檢查、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. 微流體平台進行藥物篩選與化療療效監測。

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. 以乳房超音波及乳房攝影術進行台灣40-49歲婦女乳癌篩檢隨機試驗。
3. 乳房彩色彈性超音波之電腦輔助診斷。
4. 雙波段紅外線乳房影像系統之三維模型建立與血管增生定量分析。
5. 萌芽個案計畫-雙波段紅外線乳房影像系統：化療反應監控

三、其他研究計畫Other Research

1. 轉譯醫學資源中心之臨床試驗合作聯盟：乳癌

四、臨床試驗 Clinical Trial (2014~至今)

1. Kristine：一個隨機分配、多中心、開放性、雙組的第三期試驗，比較trastuzumab emtansine 併用pertuzumab與化學療法併用 trastuzumab 及 pertuzumab做為HER2陽性乳癌患者之前置輔助療法。
2. Kaitlin：一個隨機分配、多中心、開放性的第三期試驗，比較使用anthracyclines後併用trastuzumab、pertuzumab及taxane與使用anthracyclines後併用trastuzumab emtansine及pertuzumab作為可手術切除的HER2陽性原發性乳癌患者之術後輔助治療。

3. BMN 673：一項第3期、開放性、隨機分配、平行、雙組、多中心試驗，比較BMN 673與醫師選用之藥物用於罹患局部晚期及/或轉移性乳癌，且過去接受過不超過2種轉移性疾病化學治療之生殖細胞BRCA突變患者的效果。
4. PPD_GO29227：一項以AKT抑制劑 Ipatasertib (GDC-0068) 與 Paclitaxel併用，作為轉移性三重陰性乳癌病患第一線治療的隨機分配、第二期、多中心、安慰劑對照試驗。
5. AZ_OlympiAD：一個第三期、開放性、隨機、對照的多中心試驗，針對先天性BRCA1/2突變的轉移性乳癌患者，評估Olaparib之單一療法相較於醫師選用之化療的療效與安全性。
6. AZ_OlympiA：一個隨機、雙盲、平行組別、安慰劑對照的多中心第三期試驗，針對具有先天性BRCA1/2突變與高風險HER2陰性，且已完成明確的局部治療與前置輔助性（neoadjuvant）或輔助性化療的原發性乳癌患者，評估olaparib相較於安慰劑作為輔助療法之療效與安全性。
7. Abbvie：一項針對患有初期三重陰性乳癌 (TNBC) 受試者，以評估增添 Veliparib 加 Carboplatin 於標準前導性化療相較於增添 Carboplatin 至標準前導性化療相較於標準前導性化療的安全性與療效之隨機分配、安慰劑對照、雙盲、第 3 期試驗。
8. PPD Her2+：一項第 3 期、雙盲、隨機分配、平行分組、活性藥物對照試驗，比較 CT-P6 與Herceptin作為 HER2 陽性早期乳癌患者的新輔助性與輔助性療法，其療效與安全性。
9. Kailee：一項隨機、多中心、開放標示第三期臨床試驗，針對疾病進展或復發之HER-2陽性局部晚期或轉移性乳癌患者，評估Trastuzumab emtansine (T-DM1)對照Trastuzumab併用 Docetaxel，作為第一線治療之療效與安全性。
10. 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。
11. JPBM：一項隨機分配、雙盲、安慰劑對照的第3期試驗，使用非類固醇類芳香環轉胺酶抑制劑(Anastrozole或Letrozole)合併LY2835219 (一種CDK4/6抑制劑)或合併安慰劑，治療荷爾蒙受體陽性、HER2陰性的局部復發或轉移性乳癌停經女性患者且此疾病未曾接受過全身性治療。
12. Pfizer：一項多中心、隨機分配、雙盲之第三期臨床試驗，以 Palbociclib (口服 CDK 4/6 抑制劑) 併用letrozole，比對安慰劑併用 letrozole，治療具ER (+)、HER2 (-) 晚期乳癌且不曾接受過治療之亞洲停經女性患者。
13. JPBY：第二期前導性試驗，評估於荷爾蒙受體呈陽性(HR+)、人類上皮細胞生長因子受體2呈陰性(HER2-)乳癌停經後女性施予2週Abemaciclib (LY2835219)與Anastrozole合併療法，相較於使用Abemaciclib單一療法和Anastrozole單一療法的生物效應，以及評估後續14週Abemaciclib(LY2835219)與Anastrozole合併療法的臨床療效和安全性。
14. 1280.4：一項比較BI 836845聯合Exemestane和Everolimus與僅使用Exemestane和Everolimus用於治療患有局部晚期或轉移型乳癌的女性患者的Ib / II期隨機臨床試驗。
15. 評估 Afatinib 合併太平洋紫杉醇用於三重陰性乳癌之術前治療第II 期臨床試驗的療效並尋求預測Afatinib 有效性之生物標記。
16. 一項多國多中心，針對三陰性乳癌治療的長期結果與影響的長期追蹤研究。
17. 與賀爾蒙受體陽性、Her2陰性的早期乳癌預後相關的單核.酸多型性變異的功能性分析暨探討次世代基因定序發現的單核.酸多型性變異在預後的重要性。

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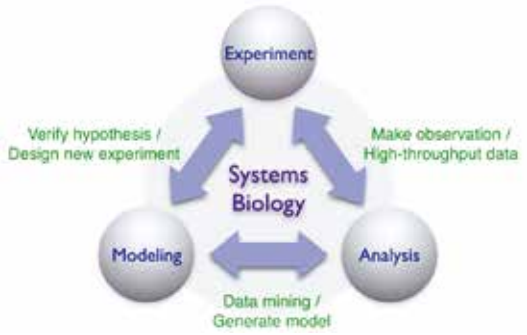
系統生物學研究室
Systems Biology Lab.

本研究室主要以系統生物學探討藥物在癌細胞的作用機制，內容包括運用各種體學資料進行各蛋白質間交互作用的預測和建構、基因網絡的模擬和建構，及非編碼核酸於其調控的蛋白質間交互作用及網路關係，期望進一步達到開發新藥的目地。主要的目標是利用系統生物學研究法來研究藥物誘導下胃癌、乳癌、肺癌及神經母細胞瘤細胞的分子作用機制；同時，利用系統生物學和合成生物學研究法開發新的治療方法。

The main research in our lab is to apply systems and syntheticbiology for drugdiscovery. 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

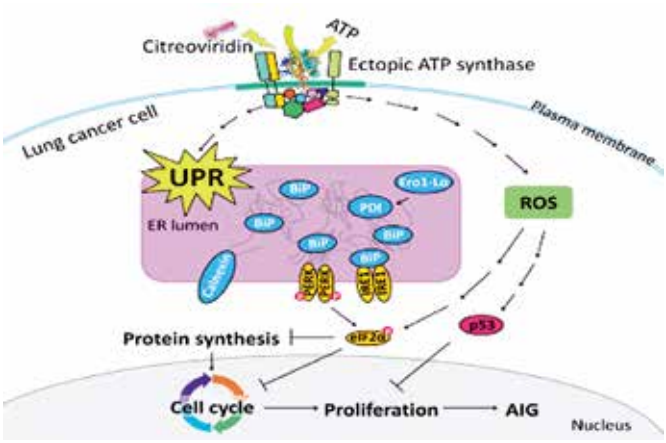
系統生物學、蛋白質體學、生物資訊、合成生物學

Systems Biology, Proteomics, Bioinformatics, Synthetic Biology

研究計畫 Research Projects

1. 結合蛋白質體學和網路生物學研究細胞膜異位表達ATP合成酶的反應路徑
   Elucidating the response pathways of ectopic ATP synthase by combining proteomics and network biology
2. 新穎致癌蛋白ZNF322A之蛋白質交互作用網路與訊息路徑研究
   Studying protein interaction networks and signal pathways of novel oncoprotein ZNF322A
3. 重定位藥物探索於神經母細胞瘤治療: 反應機制研究
   Drug repositioning for neuroblastoma therapy: investigation of the mechanism of action
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之代表圖及中英文說明：



Summary of the plausible mechanisms in breast cancer cell death induced by combination therapy targeting ectopic ATP synthase and 26S proteasome.
本圖顯示藉由以ATP合成酶和26S蛋白酶體為標靶的合併治療而誘導乳癌細胞死亡的可能機制。

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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。賴教授指導畢業的學生已有30餘名博士生及120餘名碩士生。目前實驗室成員包括博士班10餘人及碩士班10餘人。實驗室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、醫學資料探勘及資訊安全等領域為主要研究方向。

主要研究領域 Major Research Areas

醫學資訊 Medical Informatics

研究計畫 Research Projects

1. 智慧型穿戴式裝置於到院前緊急醫療救護之臨床應用─以心肺復甦術品質監測及遠距影像辨識為例

   隨著資通訊科技的蓬勃發展，穿戴式裝置被認為是具有增進健康照顧品質、改變且促進臨床照護服務模式的新興科技。從生命之鏈的角度來看，從病患不舒服叫救護車、到達急診室給醫師診治、在急診室留觀中、被收治住院、到痊癒返家，無論是醫療人員或病患皆可受惠於此。為使用智慧科技提供新一代醫療照護模式，本計畫旨在開發一套「穿戴式行動緊急救護平台」來實現知識模組的分享及應用，利用穿戴式裝置及雲端服務，結合人工智慧資通訊加值應用，以臨床決策輔助系統支援緊急救護。計畫目標主要為透過智慧手錶偵測施行心肺復甦術(Cardiopulmonary resuscitation, CPR)之相關動作資訊 (如頻率及深度)，利用人工智慧判讀自動監控CPR品質是否符合臨床規範標準，並給予回饋提示。期望透過醫療、資訊科技等專業人員密切的跨領域整合研究，提供生命之鏈中，穿戴式裝置加值應用之新思維。

2. 運用資料探勘技術於巨量資料建立醫療處置行為之精準醫學模型-以外科為例

   巨量資料探勘可縮短資料和知識之間的距離，並提供精準醫學的新視野實證醫學，成為臨床醫師經驗及判斷能力的強力依據。本計畫旨在運用資料探勘技術於巨量資料建立醫療處置行為之精準醫學模型，並以外科為重點研發主題。計畫內容主要分為兩部分，第一部分為結合標準化的應用平台、資料庫結構及

分析工具，建置巨量資料探勘應用平台，以有效執行便捷的資料探勘應用及進階統計分析，讓醫護人員等非資訊處理的專家也可以方便的使用本平台進行資料庫探勘研究。另一方面，則延續本研究團隊在腸胃道手術後血糖調控改變的研究，預計利用全國健保資料庫探討胰臟尾部切除術及全胃切除術病患，其血糖調控改善或惡化的關鍵預測因子。此外，為考量研究精確性及再現性，將另外使用醫院電子病歷進行相關研究，期望電子病歷可補強健保資料庫因缺乏部分臨床檢驗值及生活型態資訊所未能達成的研究面向，使健保資料庫及電子病歷能相互補，以提出更具有實證醫學基礎之研究成果。期望透過工程經驗及科學經驗，輔以統計及醫學等各知識領域的結合應用，轉換巨量醫學資料探勘之可用知識，並加以建模及可視化，以解決醫學實證需求，並作為醫療人員決策制定與評估之依據。

3. 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。

4. 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caremanager, 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。

5. 睡眠障礙管理資訊系統及巨量資料分析

本子計畫目標在於開發一套睡眠障礙管理資訊系統平台的臨床決策支援系統(clinical decision support system)，以支持臺大醫院睡眠中心將睡眠障礙診斷治療服務推廣到病友家中，病友可以在家自行裝置腦電波等相關量測儀器並且透過網際網路將睡眠相關生理訊號不間斷即時傳到臺大睡眠中心，讓個管師可在遠方即時有效率的監控病人睡眠情形。本計畫尚包括分析所收集之大量病友生理資訊，例如腦電波、心電圖、肌電圖、眼動圖、體溫及血壓等，結合問卷評估資料及電子病歷，希望藉此找出與睡眠障礙之間的關聯性，並且利用機器學習方式提供睡眠障礙的自動分類判讀。

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演算法實驗室
Algorithmic Research Lab.

演算法實驗室於2005年成立　本實驗室的研究專注於基礎演算法的設計　分析以及應用

The Lab of Algorithmic Research was established in 2005. Our research focuses on fundamental algorithms and their applications.

主要研究領域 Major Research Areas

演算法、圖論

Algorithms, Graph Theory

研究計畫 Research Projects

圈與洞之圖論演算法

圖論演算法與資料結構之研究

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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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臨床-生物醫學工程-產業融合實驗室
Merger Laboratory for Clinical Sciences, Biomedical Engineering and Industry

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：敞開各專業的藩籬，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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Y. Jane Tseng, Professor

國立臺灣大學生醫電子與資訊學研究所教授
國立臺灣大學資訊科學與工程學系教授
國立臺灣大學藥學系教授
國立臺灣大學生命科學院與中央研究院合辦-基因體與系統生物學學位學程教授
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
國立臺灣大學化學生物學暨分子生物物理學國際研究生博士學位學程教授
國立臺灣大學基因體醫學研究中心-代謝體核心實驗室主持人

Director, Drug Research Center, National Taiwan University
Associate Director, The Neurobiology and Cognitive Science Center, National Taiwan University
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Principal Investigator, Metabolomics Core Lab, NTU Center of Genomic Medicine

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。

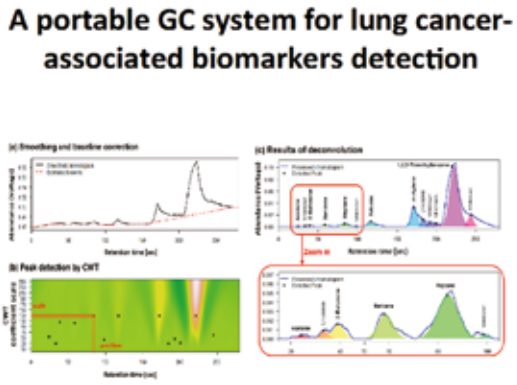
Bioinformatics and Cheminformatics Laboratory is a multidisciplinary lab. There are two main researchthemes in this lab. First and the major one is to analyze molecular structures such as drugs, endogenousmolecules, proteins, and relate the structure for their pattern with biological activities, toxicities,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

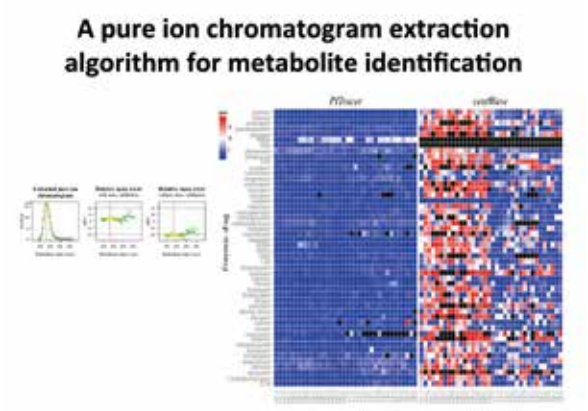
主要研究領域 Major Research Areas

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. 國家型科技計畫--(總計畫暨子計畫一)【從現有市場藥品之代謝物設計新型NMDA 受體調節劑及安全性評估 II】
2. 一般型研究計畫【開發一可攜式氣體分析儀應用於K他命檢測】
3. 補助學者提昇國際影響力【積極參與美國化學學會學術議程委員及藥物開發研討會主席以拓展國際新藥開發視野 (1/3)】
4. 產業前瞻技術計畫【RS-D7-用於治療思覺失調症負性症狀的新型NMDA受體調節劑(1/2)】





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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

1. Meng-Chi Hsieh, Ching-Yi Tsai, Min-Chiao Liao, Jenq-Lin Yang, Chia-Hao Su*, Jyh-Horng Chen*"Quantitative Susceptibility Mapping-Based Microscopy of Magnetic Resonance Venography (QSM-mMRV) for In Vivo Morphologically and Functionally Assessing Cerebromicrovasculature in Rat Stroke Model". PLoS One 2016 14;11(3):e0149602. Epub 2016 Mar 14.
2. Meng-Chi Hsieh, Li-Wei Kuo, Yun-An Huang, Jyh-Horng Chen* "Investigating hyperoxic effects in the rat brain using quantitative susceptibility mapping based on MRI phase". Magn Reson Med 2016 Feb 1. Epub 2016 Feb 1.
3. Ai-Ling Hsu, Kun-Hsien Chou, Yi-Ping Chao, Hsin-Ya Fan, Changwei W Wu*, Jyh-Horng Chen* ."Physiological Contribution in Spontaneous Oscillations: An Approximate Quality-Assurance Index for Resting-State fMRI Signals". PLoS One 2016 12;11(2):e0148393. Epub 2016 Feb 12.

※ 研討會論文 Conference & proceeding papers

1. Hsin-Chih Lo, Meng-Chi Hsieh, Der-Yow Chen, Ke-Hsin Chen, Jyh-Horng Chen. "Quantitative Susceptibility Functional MRI (QS-fMRI) of Rat Brain during Flashing Light Stimulation". The 9th annual meeting of the World Molecular Imaging Congress, New York, USA, September 7-10, (2016)
2. Yi-Hang Tung, Wan-Ting Zhao, Edzer, L. Wu, Tzi-Dar Chiueh, Jyh-Horng Chen. "SE-WMRI IntraGate Cardiac Imaging with Reduced Motion Artifact". The 9th annual meeting of the World Molecular Imaging Congress, New York, USA, September 7-10, (2016)
3. Fu-Hsing Wu, Yi-Hang Tung, Edzer L. Wu1, Po-Wei Cheng and Jyh-Horng Chen. "Low SAR SLR RF Pulse for Simultaneous 3-slice MR Imaging of Human Brain". The 9th annual meeting of the World Molecular Imaging Congress, New York, USA, September 7-10, (2016)
4. Po-Jung Sung, Meng-Chi Hsieh, Jyh-Horng Chen. "A Flexible Four-channel Phased-array for Rat Cerebral Nervous System Imaging in 7T MRI". The 9th annual meeting of the World Molecular Imaging Congress, New York, USA, September 7-10, (2016)

陳永耀教授 Yung-Yaw Chen, Professor

※ 學術期刊論文 Journal articles

1. Sheng-Fan Wen, Jia-Yush Yen, Shih-Tang Liu, Fu-Cheng Wang, Min-Shin Chen, Yung-Yaw Chen and Chung-Wen Hung (2017, Apr), "Compensation of the residual error from the charge feedback control of a piezoelectric-actuated stage", Proc of Institute of Mechanical Engineers Part I:Journal of Systems and Control Engineering, Volume 231, Issue 5, pp. 414-424. (MOST 103-2218-E-002-001)

※ 研討會論文 Conference & proceeding papers

1. Wei-Ju Hsu, Chih-Chien Chien, Ming-Chih Ho, Jia-Yush Yen, Yung-Yaw Chen (2016, Nov). "Intelligent Finite Element Computations of Tissue Deformations for MIS Visualization", 2016 International Automatic Control Conference (CACS 2016). (MOST 104-2221-E-002-195-MY3)

2. Zhi-Xiang Liu, Zheng-Hong Ma, Ming-Chih Ho, Jia-Yush Yen, Yung-Yaw Chen(2016, Nov), "Multiple Near-infrared Emitters for Optimal Gaze Point Estimations", 2016 International Automatic Control Conference (CACS 2016) (MOST 104-2221-E-002-195-MY3)

成佳憲教授 Chia-Hsien Cheng, Professor

※ 學術期刊論文 Journal articles

1. Tsai CL, Liu WL, Hsu FM, Yang PS, Yen RF, Tzen KY, Cheng AL, Chen PJ, Cheng JC*. Targeting histone deacetylase 4/Ubc9 impairs DNA repair for radiosensitization of hepatocellular carcinoma cells. Hepatology 2017 (in press) (SCI)
2. Hou WH, Huang CY, Wang CC, Lan KH, Chen CH, Yu HJ, Liu SP, Lai MK, Pu YS, Cheng JC*. Impact of androgen-deprivation therapy on the outcome of dose-escalation prostate cancer radiotherapy without elective pelvic irradiation. Asian J Androl 2017 (in press) (SCI)
3. Wang YJ, Huang CY, Hou WH, Wang CC, Lan KH, Yu HJ, Lai MK, Liu SP, Pu YS, Cheng JC*. Dual-timing PSA as a biomarker for patients with salvage intensity modulated radiation therapy for biochemical failure after radical prostatectomy. Oncotarget 7:44224-44235, 2016 (SCI)
4. Hsu FM, Hou WH, Huang CY, Wang CC, Tsai CL, Tsai YC, Yu HJ, Pu YS*, Cheng JC*. Differences in toxicity and outcome associated with circadian variations between patients undergoing daytime and evening radiotherapy for prostate adenocarcinoma. Chronobiology International 33:210-219, 2016 (SCI)
5. Tsai CL, Hsu FM, Cheng JC*. How to improve therapeutic ratio in radiotherapy of HCC. Liver Cancer 5:210-220, 2016(SCI)
6. Hou WH, Wang CW, Tsai CL, Hsu FM, Cheng JC*. The ratio of weight loss to planning target volume significantly impacts setup errors in nasopharyngeal cancer patients undergoing helical tomotherapy with daily megavoltage computed tomography. Radiology and Oncology 50:427-432, 2016 (SCI)
7. Ohri N, Dawson LA, Krishnan S, Seong J, Cheng JC, Sarin SK, Kinkhabwala M, Ahmed MM, Vikram B, Coleman CN, Guha C.Radiotherapy for hepatocellular carcinoma: New indications and directions for future study. J Natl Cancer Inst108:djw133, 2016 (SCI)
8. Chen Y, Zeng ZC, Shen X, Wu Z, Dong Y, Cheng JC. MicroRNA-146a-5p negatively regulates pro-inflammatory cytokine secretion and cell activation in lipopolysaccharide stimulated human hepatic stellate cells through inhibition oft Toll-like receptor 4 signaling pathways. International Journal of Molecular Sciences17:1076, 2016 (SCI)
9. Park HC, Yu JI, Cheng JC, Zeng ZC, Hong JH, Wang ML, Kim MS, Chi KH, Liang PC, Lee RC, Lau WY, Han KH, Chow PK, Seong J. Consensus for radiotherapy in hepatocellular carcinoma from the 5th Asia-Pacific Primary Liver Cancer Expert Meeting (APPLE 2014): Current practice and future clinical trials.Liver Cancer 5:162-174, 2016(SCI)

※ 研討會論文 Conference & proceeding papers

1. Cheng JC, Liu WL, Tsai CL, Hsu FM. Preclinical study on radiosensitization by combining a novel drug Lipotecan with radiotherapy in hepatocellular carcinoma.Proceedings of the 58th Annual Meeting of the American Society for Radiation Oncology. Boston,U.S.A.,September25-28, 2016. (Abstract)
2. Cheng JC, Liu WL, Tsai CL, Hsu FM, Wang TE, Liu CY, Chen YJ. Superior radiosensitizing effect of a novel drug Lipotecan to sorafenib with radiotherapy in preclinical and clinical pilot studies on hepatocellular carcinoma. Proceedings of the 7th Asian Pacific Primary Liver Cancer Expert Meeting. Hong Kong, July 8-10, 2016. (Abstract)

莊曜宇教授 Eric Y.Chuang, Professor

※ 學術期刊論文 Journal articles

1. Y.C. Chiu, M.H. Tsai, W.C. Chou, Y.C. Liu, Y.Y. Kuo, H.A. Hou, T.P. Lu, L.C. Lai,Y. Chen, H.F. Tien, E.Y. Chuang*. Prognostic significance of NPM1 mutation-modulated microRNA mRNA regulation in acute myeloid leukemia. Leukemia
2. Chia-Ti Tsai, Chia-Shan Hsieh, Sheng-Nan Chang, E.Y. Chuang, Kwo-Chang Ueng, Chin-Feng Tsai, Tsung-Hsien Lin, Cho-Kai Wu, Jen-Kuang Lee, Lian-Yu Lin, Yi-Chih Wang, Chih-Chieh Yu, Ling-Ping Lai, Chuen-Den Tseng, Juey-Jen Hwang, Fu-Tien Chiang & Jiunn-Lee Lin. Genome-wide screening identifies a KCNIP1 copy number variant as a genetic predictor for atrial fibrillation, Nature Communications
3. E.Y. Li, W.Y. Huang, Y.C. Chang, M.H. Tsai, E.Y. Chuang, Q.Y. Kuok, S.T. Bai, L.Y. Chao, Y.P. Sher, and L.C. Lai. Aryl Hydrocarbon Receptor Activates NDRG1 Transcription under Hypoxia in Breast Cancer Cells. Sci Rep
4. Wei-An Wang, Liang-Chuan Lai, Mong-Hsun Tsai, Tzu-Pin Lu, E.Y. Chuang*. Development of a prediction model for radiosensitivity using theexpression values of genes and long non-coding RNAs. Oncotarget
5. Chi-Yun Wu, E.Y. Chuang*, Tzu-Pin Lu, Low correlation of lncRNA and target gene expression in microarray data. Transl Cancer Res
6. Govinda Lenka, Mong-Hsun Tsai, Jen-Hao Hsiao, Liang-Chuan Lai, E.Y. Chuang*, Overexpression of methylation-driven DCC suppresses proliferation of lung cancer cells. Transl Cancer Res
7. Yi-Hsuan Chang, Yu-Chiao Chiu1, Yu-Ching Hsu, Hui-Mei Tsai, E.Y. Chuang*, Tzu-Hung Hsiao, Applying gene set analysis to characterize the activities of immune cells in estrogen receptor positive breast cancer. Transl Cancer Res
8. Yu-Ching Hsu, Yu-Chiao Chiu, Wei-Yi Liu, Chia-Yang Cheng, Tzu-Hung Hsiao, Mong-Hsun Tsai and E.Y. Chuang*, A simple gene set-based analysis accurately predicts the synergy of drug pairs. BMC Systems Biology
9. Cheng-Ying Shen, Li-Han Chen, Yu-Fen Lin, Liang-Chuan Lai, E.Y. Chuang, Mong-Hsun Tsai. Mitomycin C treatment induces resistance and enhanced migration via phosphorylated Akt in aggressive lung cancer cells. OncotargetYi-Pin Lai, Liang-Bo Wang, Wei-An Wang, Liang-Chuan Lai,

Mong-Hsun Tsai, Tzu-Pin Lu, E.Y. Chuang*, iGC—an integrated analysis package of gene expression and copy number alteration. BMC Bioinformatics

10. Govinda Lenka, Mong-Hsun Tsai, Hsin-Chieh Lin, Jen-Hao Hsiao, Yi-Ching Lee, Tzu-Pin Lu, Jang-Ming Lee, Chung-Ping Hsu, Liang-Chuan Lai & E.Y. Chuang*, Identification of Methylation-Driven, Differentially Expressed STXBP6 as a Novel Biomarker in Lung Adenocarcinoma. Scientific Reports

11. Yu-Chiao Chiu, Li-Ju Wang, Tzu-Pin Lu, Tzu-Hung Hsiao, Eric Y. Chuang, Yidong Chen, Differential correlation analysis of glioblastoma reveals immune ceRNA interactions predictive of patient survival. BMC Bioinformatics

※ 研討會論文 Conference & proceeding papers

1. Integration of Genomics and Bioinformatics for Exploring Cancer Biomarkers, 1st Chinese Precision Medicine Forum on Lung Cancer & 4th National Cancer Institute Annual Symposium, Beijing, China, 2016.

2. Using Genomics and Bioinformatics Approaches to Explore Cancer Biomarkers, Radiation Oncology, MD Anderson Cancer Center, April 20-21, 2016, Houston, USA

※ 專書 Book Chapters

1. Jie He, Rafael Rosell, Eric Y. Chuang, “Lung Cancer Percision Medicine”, 2016, ISBN: 978-988-14028-1-3

黃念祖助理教授 Nien-Tsu Huang, Assistant Professor

※ 學術期刊論文 Journal articles

1. H. T.-H. Lin, C.-K. Yang, C.-C. Lin, A. M.-H. Wu, L. A. Wang and N.-T. Huang*, “A Large-Area Nanoplasmonic Sensor Fabricated by Rapid Thermal Annealing Treatment for Label-Free and Multi-Point Immunoglobulin Sensing” Nanomaterials, 7(5), pp. 100; 2017/05

2. D.-H. Kuan, I.-S. Wang, J.-R. Lin, C.-H. Yang, C.-H. Huang, Y.-H. Lin, C.-T. Lin and N.-T. Huang*,” A microfluidic device integrating dual CMOS polysilicon nanowire sensors for on-chip whole blood processing and the simultaneous detection of multiple analytes” Lab on a Chip, Volume 16,Issue 16, pp.3105 – 3113, 2016/08. (*Corresponding authors) (Fields: Biochemical research methods: 6/72, SCI, Impact Factor: 5.59, Citation number: 1)

※ 研討會論文 Conference & proceeding papers

1. Yuh-Jen Hwong, N.-T. Huang,” A microfluidic device with hydrodynamic trap arrays for white blood cell counting in peritoneal dialysis solution”, IEEE EMBC’17, 2017, July 12 to 15, 2017.

2. H. T.-H. Lin, C.-C. Lin, and N.-T. Huang, “A Large-Area Nanoplasmonic Sensor Fabricated by Rapid Thermal Annealing Treatment for Label-Free and Multi-Point Immunoglobulin Sensing”, CLEO: Applications and Technology2017, May 13 to 18, 2017.

3. Da-Han Kuan, I-Shun Wang, Chih-Ting Lin, Nien-Tsu Huang, “A microfluidic device integrating dual CMOS polysilicon nanowire sensors for on-chip whole blood processing and the simultaneous detection of multiple analytes”, μTAS 2016, Dublin, Ireland, October 9 to 13, 2016.

鍾孝文教授 Hsiao-Wen Chung, Professor

※ 學術期刊論文 Journal articles

1. Lin JM, Patterson AJ, Chao TC, Zhu C, Chang HC, Mendes J, Chung HW, Gillard JH, Graves M. Free-breathing black-blood CINE fast-spin echo imaging for measuring abdominal aortic wall distensibility: a feasibility study. Physics in Medicine and Biology 2017;62:N204-N218.
2. Tsai PH, Chou MC, Chiang SW, Chung HW, Liu HS, Kao HW, Chen CY. Early white matter injuries in patients with acute carbon monoxide intoxication: a tract-specific diffusion kurtosis imaging study and STROBE compliant article. Medicine 2017;96:e5982.
3. Chiu SC, Chang HC, Chu ML, Wu ML, Chung HW, Lin YR. De-aliasing for signal restoration in Propeller MR imaging. Magnetic Resonance Imaging 2017;36:12-15.
4. Ho KC, Fang YD, Chung HW, Liu YC, Chang JW, Hou MM, Yang CT, Cheng NM, Su TP, Yen TC. TLG-S criteria are superior to both EORTC and PERCIST for predicting outcomes in patients with metastatic lung adenocarcinoma treated with erlotinib. European Journal of Nuclear Medicine and Molecular Imaging 2016;43:2155-2165.
5. Chen YC, Chiang SW, Chi CH, Liou M, Huang GS, Kao HW, Chung HW, Ma HI, Peng GS, Wu YT, Chen CY. Early idiopathic normal pressure hydrocephalus patients with neuropsychological impairment are associated with increased fractional anisotropy in the anterior thalamic nucleus. Medicine 2016;95:e3636.
6. Chiu SC, Cheng CC, Chang HC, Chung HW, Chiu HC, Liu YJ, Hsu HH, Juan CJ. Influence of amplitude-related perfusion parameters of parotid glands by non-fat-saturated dynamic contrast-enhanced magnetic resonance imaging. Medical Physics 2016;43:1873-1881.
7. Cheng CC, Mei CS, Duryea J, Chung HW, Chao TC, Panych LP, Madore B. Dual-pathway multi-echo sequence for simultaneous frequency and T2 mapping. Journal of Magnetic Resonance 2016;265:177-187.
8. Tsai PH, Lee HS, Siow TY, Wang CY, Chang YC, Lin MH, Hsu YC, Lee CH, Chung HW, Huang GS. Abnormal perfusion in patellofemoral subchondral bone marrow in the rat anterior cruciate ligament transection model of post-traumatic osteoarthritis: a dynamic contrast-enhanced magnetic resonance imaging study. Osteoarthritis and Cartilage 2016;24:129-133.

※ 研討會論文 Conference & proceeding papers

1. Chiu SC, Lin TM, Lin JM, Chung HW, Ko CW, Büchert M, Bock M (2017) Effects of RF pulse profile and within-slice phase dispersion on accuracy of MR fingerprinting with balanced SSFP readout, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #80, Honolulu, Hawaii, USA.
2. Lin JM, Tsai SY, Chang HC, Chung HW, Chen HC, Lin YH, Lee CW, Chen YF, Scoffings D, Das T, Gillard JH, Patterson AJ, Graves MJ (2017) Pseudo-inverse constrained (PICO) reconstruction reduces colored noise of PROPELLER and improves the gray-white matter differentiation, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #1524, Honolulu, Hawaii, USA.
3. Tsai PH, Chen YC, Chiang SW, Liu HS, Chou MC, Hsu FT, Kao YC, Lu CF, Chung HW, Chen CY (2017) Increased anisotropy as possible compensatory plasticity of ventral thalamic nuclei to gait disturbance in patients with idiopathic normal pressure hydrocephalus, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #2432, Honolulu, Hawaii, USA.

4. Lee MH, Chuang TC, Chung HW, Li JY, Lai PH (2017) White matter volume change of carbon monoxide intoxication: a 9-month follow-up study, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #2461, Honolulu, Hawaii, USA.
5. Wu PH, Chung HW, Wu MT, Ko CW (2017) The impact of heterogeneity on regurgitation classification for pulmonary artery after repaired Tetralogy of Fallot, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #3160, Honolulu, Hawaii, USA.
6. Tsai PH, Hsu FT, Liu HS, Chung HW, Kao YC, Lu CF, Chen HL, Blakeley P, Lee GA, Chen CY (2017) 2-deoxyglucose-weighted MR imaging in rodent brain using inverse z-spectrum analytic scheme, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #3744, Honolulu, Hawaii, USA.
7. Chao TC, Cheng YC, Wu WC, Peng HH, Chuang TC, Chung HW, Huang TY, Liu YJ (2017) Accelerated time resolved phase contrast cerebral MRA to evaluate pulse wave velocity, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #4714, Honolulu, Hawaii, USA.
8. Cheng CM, Yeh TC, Hsieh JC, Chung HW (2017) Superior sagittal sinus venous oxygen saturation based on fully automated MR susceptometry: effects of slice dependent even-odd echo discrepancy and vascular angle correction, in International Society of Magnetic Resonance in Medicine, 25th Annual Meeting, #4734, Honolulu, Hawaii, USA.

管傑雄教授 Chieh-Hsiung Kuan, Professor

※ 研討會論文 Conference & proceeding papers

1. Hsiang-Shuo Wu, Vin-Cent Su, Po-Hsun Chen, Yen-Pu Chen, Yao-Hong You, Hsiou-An Liu, and Chieh-Hsiung Kuan. (2016, Mar). Improved Internal-Quantum Efficiency of GaN-Based Light-Emitting Diodes by Patterned-Sapphire Substrates with Larger Post-Duty Cycles. International Conference on Light-Emitting Devices and Their Industrial Applications. 本人為通訊作者
2. Hsiou-An Liu, Vin-Cent Su, Po-Hsun Chen, Yen-Pu Chen, Yao-Hong You, Hsiang-Shuo Wu, and Chieh-Hsiung Kuan. (2016, Mar). Mitigation of Quantum-Confined Stark Effect by Enlarging Post-Duty Cycle of Patterned-Sapphire Substrates. International Conference on Light-Emitting Devices and Their Industrial Applications. 本人為通訊作者
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15. “A Simultaneous FMRI-EEG Acquisition to Minimize the MR Gradient Artifact on Human Auditory System”, Kevin Wen-Kai Tsai, Hsin-Ju Lee, Ching-Po Lin, Li-Wei Kuo, Wen-Jui Kuo, Toni Auranen, Simo Sarkka, Fa-Hsuan Lin, Intl. Soc. Mag. Reson. Med. (2016); 3768

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17. “Relative Latency and Temporal Variability of BOLD FMRI Signal Within Human Visual Cortex”, Jo-Fu Lotus Lin, Jonathan Polimeni, Fa-Hsuan Lin, Intl. Soc. Mag. Reson. Med. (2016); 644

18. “Reduce Multislice Excitation RF Power by ROI Optimization Method”, Yi-Cheng, Hsu, Ying-Hua Chu, Fa-Hsuan Lin, Intl. Soc. Mag. Reson. Med. (2016); 1890

19. “Multi-Slice Spiral Imaging Trajectory Mapping Using High Density 25-Channel Field Probe Array”, Ying-Hua Chu, Yi-Cheng, Hsu, Fa-Hsuan Lin, Intl. Soc. Mag. Reson. Med. (2016); 4282
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22. “Decoupling Between Coils in a Flexible Phased-Array Using Stacked Circumferential Shielding”, Jhy-Neng Tasso Yeh, Fa-Hsuan Lin, Intl. Soc. Mag. Reson. Med. (2016); 3522

孫啓光特聘教授 Chi-Kuang Sun , Distinguished Professor

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1. W.-H. Weng, Y.-H. Liao, M.-L. Wei, M.-R. Tsai,H.-Y. Huang, and C.-K. Sun, “Differentiating intratumoral melanocytes from Langerhans cells in non-melanocytic pigmented skin tumors in vivoby label-free third harmonic generation microscopy,”Journal of Biomedical Optics21 (7), 076009 (2016).
2. I. Buttino, J.-S. Hwang, G. Romano, C.-K. Sun, T.-M. Liu, D. Pellegrini, A. Gaion, and D. Sartori, “Detection of malformations in sea urchin plutei exposed to mercuric chloride using different fluorescent techniques,”Ecotoxicology and Environmental Safety123, pp. 70-80 (2016).
3. K. S. Brink, Y.-C. Chen, Y.-N. Wu, W.-M. Liu, D.-B. Shieh, T. D. Huang, C.-K. Sun, and R. R. Reisz, “Dietary adaptions in the ultrastructure of dinosaur dentine,” Journal of the Royal Society Interface13 (125), 20160626 (2016). Journal Cover
4. G. Deka, C.-K. Sun, K. Fujita, and S.-W. Chu, “Nonlinear plasmonic imaging techniques and their biological applications,” Nanophotonics6 (1), pp. 31-49 (2017). Review Article
5. C.-K. Sun, Y.-C. Tsai, Y.-J. E. Chen, T.-M. Liu, H.-Y. Chen, H.-C. Wang, and C.-F. Lo, “Resonant dipolar coupling of microwaves with confined acoustic vibrations in a rod-shaped virus,” to be published in Scientific Reports (2017).

※ 研討會論文 Conference & proceeding papers

1. C.-K. Sun and T.-D. Wang, “High sensitivity of THz Waves to the early stage coagulation of human blood,” Book of Abstract of The 9th Asian Conference on Ultrafast Phenomena (ACUP 2016), pp. 18, Quezon City, Philippines (2016). Invited Speaker
2. C.-K. Sun, W.-M. Liu, Y.-H. Su, M.-L. Wei, and Y.-H. Liao, “A study on the origin of enhanced third-harmonic generation in melanin for in vivo label-free melanin imaging,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 79, Taipei, Taiwan (2016).
3. W.-H. Weng, Y.-H. Liao, H.-Y. Huang, and C.-K. Sun, “Differentiating intratumoral melanocytes from Langerhans cells in non-melanocytic pigmented skin tumors using third harmonic generation microscopy,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 253, Taipei, Taiwan (2016).

4. Y.-H. Su, Y.-H. Liao, and C.-K. Sun, “In vivo evaluating therapeutic effects of pigment-targeted laser treatments using harmonic generation microscopy,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 147, Taipei, Taiwan (2016).
5. M.-L. Wei, W.-H. Weng, Y.-T. Shih, G.-L. Lin, Y.-H. Liao, and C.-K. Sun, “Optical biopsy of melasma for the diagnosis, prognosis, and therapeutic decision using in vivo non-invasive harmonic generation microscopy,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 148, Taipei, Taiwan (2016).
6. J.-H. Lee, Y.-T. Shih, B.-L. Chiang, and C.-K. Sun, “Assessment of pediatric atopic dermatitis by third-harmonic generation signals from epidermal barrier using Cr:forsterite laser-based nonlinear microscopy,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 149, Taipei, Taiwan (2016).
7. T.-Y. Cheng, S.-Y. Lee, J.-C. Lee, R. Oketani, C.-Y. Lin, C.-T. Yen, H.-J. Tsai, K. Fujita, S. Kawata, and C.-K. Sun, “Super-resolution two-photon fluorescence microscopy through fluorescence saturation,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 258, Taipei, Taiwan (2016).
8. H.-C. Gao, Y.-C. Chen, C.-M. Lee, and C.-K. Sun, “Visualize susceptibility information with third harmonic generation microscopy and spectroscopy,” in Program and Abstract Book of Focus on Microscopy (FOM 2016), pp. 307, Taipei, Taiwan (2016).
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10. C.-K. Sun, “In vivo virtual biopsy of human skin using noninvasive multi-harmonic generation microscopy,” Proceedings of The 10th Asia-Pacific Laser Symposium (APLS 2016), paper Wed-E2-1, pp. 52, Jeju Island, Korea (2016). Invited Speaker
11. C.-K. Sun and T.-D. Wang, “Noninvasive THz sensing of critical components in human blood,” Conference Program and Proceedings of The 5th Advanced Lasers and Photon Sources Conference (ALPS '16), Optics & Photonics International Congress 2016, paper ALPS15-1, Yokohama, Japan (2016). Invited Speaker
12. C.-K. Sun and S.-C. Yang, “The effect of periodicity in GaN nanorod arrays for hypersonic imaging,” Book of Abstracts of 23rd International Congress on Sound and Vibration (ICSV23), paper #56, pp. 87, Athens, Greece (2016).
13. C.-K. Sun and M.-Y. Weng, “In Situ Nanoultrasonic Imaging of Anodic Oxidation during Photoelectrochemical Water Splitting,” Book of Abstracts of 5th International Symposium on Laser-Ultrasonics and Advanced Sensing (LU2016), paper 13A.2, pp. 85, Linz, Austria (2016).
14. C.-K. Sun, Y.-C. Tsai, and C.-L. Kao, “Structure Resonance Energy Transfer from EM Wave to Rod-like Virus,” in Proceedings of the 41st International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz 2016), paper F2B.5, Copenhagen, Denmark (2016).
15. C.-K. Sun, “Full spectral sensitivity of THz waves to early coagulation of human blood,” in Proceedings of The 8th International Symposium on Ultrafast Phenomena and Terahertz Waves (ISUPTW 2016), paper IM3B.1, Chongqing, China (2016). Keynote Speaker
16. C.-K. Sun, “Efficient Structure Resonant Energy Transfer from EM Waves to Viruses for Virus Inactivation,” in Proceedings of the Infrared, Millimeter-Wave, and Terahertz Technologies IV symposium, SPIE Photonics Asia, paper 10030-21, Beijing, China (2016). Invited Speaker

17. C.-K. Sun, “Clinical in vivo higher harmonic generation microscopy for pre-/post-operative imaging with a histopathological accuracy,” Global Engage’s2nd Microscopy Congress, London, United Kingdom (2016). Invited Speaker

18. C.-K. Sun, “Quantitative harmonic generation microscopic imaging of melanin for differential diagnosis and intra-operative assessment of pigmented skin lesions,”Japan-Taiwan Medical Spectroscopy International Symposium and 14th Annual Meeting of the Japan Association of Medical Spectroscopy, Awaji Island, Japan (2016). Keynote Lecturer

19. K.-H. Lin, M.-L. Wei, Y.-H. Liao, G.-G. Lee, and C.-K. Sun, “Quantitative analysis of intrinsic skin aging in basal keratinocytes in skin type I and II by in vivo harmonic generation microscopy,” Japan-Taiwan Medical Spectroscopy International Symposium and 14th Annual Meeting of the Japan Association of Medical Spectroscopy, paper P-077, Awaji Island, Japan (2016). Best Student Paper Award

20. C.-T. Kao, M.-L. Wei, Y.-H. Liao, and C.-K. Sun, “Ex vivo 3D deep tissue imaging of hematoxylin and eosin by using Cr:forsterite-based nonlinear microscopy,” Japan-Taiwan Medical Spectroscopy International Symposium and 14th Annual Meeting of the Japan Association of Medical Spectroscopy, paper P-078, Awaji Island, Japan (2016).

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23. F.-H. Chang and C.-K. Sun, “Novel physical properties of lipid-coated nanoparticles for molecular imaging and therapy,” Japan-Taiwan Medical Spectroscopy International Symposium and 14th Annual Meeting of the Japan Association of Medical Spectroscopy, paper P-084, Awaji Island, Japan (2016).

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25. C.-T. Kao, M.-L. Wei, Y.-H. Liao, and C.-K. Sun, “3D imaging of hematoxylin and eosin stained thick tissues with a sub-femtoliter resolution by using Cr:forsterite-laser-based nonlinear microscopy,” in Photonics in Dermatology and Plastic Surgury, Photonics West, paper 10037-15, San Francisco, CA (2017).

26. L. C. Cahill, M. G. Giacomelli, C.-K. Sun, T. Yoshitake, H. Vardeh, D. B. Schmoltze, J. C. Connolly, J. G. Fujimoto, “Multiphoton fluorescence microscopy using a 1m fiber laser for rapid evaluation

of breast surgical specimens," Advanced Biomedical and Clinical Diagnosis and Surgical Guidance System XV, Photonics West, paper 10054-14, San Francisco, CA (2017).

27. T.-C. Hung, Y.-R. Huang, J.-K. Sheu, and C.-K. Sun, "How thin should a vitreous silica layer be for boson peak measurement," Ultrafast Phenomena and Nanophotonics XXI, Photonics West, paper 10102-54, San Francisco, CA (2017).

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30. K.-H. Lin, M.-L. Wei, Y.-H. Liao, G.-G. Lee, and C.-K. Sun, "Comparative analysis of skin type effect on intrinsic skin aging by in vivo harmonic generation microscopy," in Program and Abstract Book of Focus on Microscopy (FOM 2017), paper P2-C/8, Bordeaux, France (2017).

31. C.-K. Sun, "Imaging interface using femtosecond ultrasonics," in Program Book of Son & Lumiere 2017: Combining light and sound at the nanoscale, pp. 15, Les Houches, France (2017). Tutorial Talk

32. C.-K. Sun, "Noninvasive dermatological micro-imaging of melanin for histopathological diagnosis and treatment assessment," Proceedings of The 2017 EITA Conference on New Materials, Nanotechnology and New Energy (EITA-New Materials 2017), Ann Arbor, MI (2017). Plenary Talk

宋孔彬副教授 Kung-Bin Sung, AssociateProfessor

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1. P. H. Wang, V. R. Singh, J. M. Wong, K. B. Sung, and Y. Luo, "Non-axial-scanning multifocal confocal microscopy with multiplexed volume holographic gratings," Optics letters, 42(2), 346-349, 2017.
2. P. Y. Liu, L. K. Chin, W. Ser, H. F. Chen, C.-M. Hsieh, C.-H. Lee, K.-B. Sung, T. C. Ayi, P. H. Yap, B. Liedberg, K. Wang, T. Bourouinaj and Y. Leprince-Wang, "Cell refractive index for cell biology and disease diagnosis: past, present and future," Lab on a Chip, 16(4), 634-644, Feb. 2016.

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1. Kung-Bin Sung, Yang-Hsien Lin, Fong-Jheng Lin, Chao-Mao Hsieh, Shang-Ju Wu, "Investigation of light scattering characteristics of individual leukocytes using three-dimensional refractive index maps," Proc. SPIE 10251, Biomedical Imaging and Sensing Conference, Yokohama, Japan (April 2017)
2. Fan-Hua Ko, Gen-Hao Tien, Min-Jie Chuang, Tsan-Hsueh Huang, Ming-Hua Hung, and Kung-Bin Sung, "In-vivo diffuse reflectance spectroscopy (DRS) of oral mucosa of normal volunteers,"Biomedical Optics 2016: Optical Tomography and Spectroscopy, paper JTu3A.45, Fort Lauderdale, FL United States (April 2016).
3. Ting-Wen Yu, Gen-Hao Tien, Fang-Wei Hsu, and Kung-Bin Sung, "Extracting Fluorescence Efficiency with a GPU-Based Monte Carlo Model for Two-Layer Mucosal Tissue,"Biomedical Optics 2016: Optical Tomography and Spectroscopy, paper JTu3A.10, Fort Lauderdale, FL United States (April 2016), – received OSA student travelling grant.

4. Andy Liao and Kung-Bin Sung, "Simulation Study on Optimal Probe Numerical Aperture for Diffuse Reflectance Spectroscopy,"Biomedical Optics 2016: Optical Tomography and Spectroscopy, paper JM3A.17, Fort Lauderdale, FL United States (April 2016).

吳文超副教授 Wen-Chau Wu, Associate professor

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1. Ya-Fang Chen, Sung-Chun Tang, Wen-Chau Wu*, Hsien-Li Kao, Yen-Shu Kuo, Shun-Chung Yang, "Alterations of cerebral perfusion in asymptomatic internal carotid artery steno-occlusive disease" Sci Rep 2017;7(1):1841.
2. Wen-Chau Wu*, Shun-Chung Yang, Ya-Fang Chen, Han-Min Tseng, Pei-Chi My, "Simultaneous assessment of cerebral blood volume and diffusion heterogeneity using hybrid IVIM and DK MR imaging: initial experience with brain tumors" Eur Radiol 2017;27(1):306-314.

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1. Yen-Shu Kuo, Shun-Chung Yang, Ya-Fang Chen, Wen-Chau Wu*. "Can fast diffusion kurtosis imaging be quantitative in the brain?" Proc. ISMRM 25th Ann. Meeting, Honolulu, Hawaii, USA, 2017.
2. Ya-Fang Chen, Sung-Chun Tang, Yen-Shu Ko, Wen-Chau Wu*. "Assessment of cerebral perfusion changes in asymptomatic ICAS using multi-parametric ASL MRI" Proc. ISMRM 25th Ann. Meeting, Honolulu, Hawaii, USA, 2017.
3. Ya-Fang Chen, Hsiang-Kuang Liang, Wen-Chau Wu*. "Multivariate assessment of brain glioma using hybrid IVIM and DK MRI" Proc. ISMRM 24th Ann. Meeting, Singapore, Singapore, 2016.
4. Yen-Shu Kuo, Han-Min Tseng, Wen-Chau Wu*. "Differentiating contrast-enhanced glioma from peritumoral edema using the intravascular fraction derived from IVIM MRI – a comparative study with DSC MRI" Proc. ISMRM 24th Ann. Meeting, Singapore, Singapore, 2016.

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

※ 學術期刊論文 Journal articles

1. Lin PY, Lin CH, Yang PC: Factors in Association Between Parkinson Disease and Risk of Cancer in Taiwan-Reply. JAMA Oncol. 2016 Jan 1;2(1):145-6.
2. Ho BC, Yang PC, Yu SL: MicroRNA and Pathogenesis of Enterovirus Infection. Viruses. 2016 Jan 6;8(1). Review.
3. Wang Z, Seow WJ, Shiraishi K, Hsiung CA, Matsuo K, Liu J, Chen K, Yamji T, Yang Y, Chang IS, Wu C, Hong YC, Burdett L, Wyatt K, Chung CC, Li SA, Yeager M, Hutchinson A, Hu W, Caporaso N, Landi MT, Chatterjee N, Song M, Fraumeni JF Jr, Kohno T, Yokota J, Kunitoh H, Ashikawa K, Momozawa Y, Daigo Y, Mitsudomi T, Yatabe Y, Hida T, Hu Z, Dai J, Ma H, Jin G, Song B, Wang Z, Cheng S, Yin Z, Li X, Ren Y, Guan P, Chang J, Tan W, Chen CJ, Chang GC, Tsai YH, Su WC, Chen KY, Huang MS, Chen YM, Zheng H, Li H, Cui P, Guo H, Xu P, Liu L, Iwasaki M, Shimazu T, Tsugane S, Zhu J, Jiang G, Fei K, Park JY, Kim YH, Sung JS, Park KH, Kim YT, Jung YJ, Kang CH, Park IK, Kim HN, Jeon HS, Choi JE, Choi YY, Kim JH, Oh IJ, Kim YC, Sung SW, Kim JS, Yoon HI, Kweon SS, Shin MH, Seow A, Chen Y, Lim

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5. Chen HY, Liu CH, Chang YH, Yu SL, Ho BC, Hsu CP, Yang TY, Chen KC, Hsu KH, Tseng JS, Hsia JY, Chuang CY, Chang CS, Li YC, Li KC, Chang GC, Yang PC: EGFR-activating mutations, DNA copy number abundance of ErbB family, and prognosis in lung adenocarcinoma. Oncotarget. 2016 Feb 23;7(8):9017-25.

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18. Chen, X.-J., Chang, H.-Y., Huang, H.-C., and Juan, H.-F.*"Temporal phosphoproteome dynamics reveals the role of ATP synthase inhibitor citreoviridin in gefitinib-resistant lung cancer cells" 31th Joint Annual Conference of Biomedical Sciences, Taipei, Taiwan, March 26-27, 2016.

19. Lin, T.-Y., Chen, W.-T., Lin, L.-L., Huang, H.-C., and Juan, H.-F.*"Integrative quantitative proteomic and phosphoproteomic analyses to reveal the regulatory role of ZNF322A" BIT2016 and Kyutech-NYMU Joint Symposium for Biomedical Informatics & Biotechnology, Taipei, Taiwan, March 3-4, 2016. (Poster Competition1st Prize)
20. Chen, Y.-P., Hsu, C.-L., Huang, H.-C., and Juan, H.-F.* "Computational methods for identification of lncRNAs interacting with MYCN in neuroblastoma" BIT2016 and Kyutech-NYMU Joint Symposium for Biomedical Informatics & Biotechnology, Taipei, Taiwan, March 3-4, 2016. (Poster Competition3rd Prize)
21. Tu, Y.-H., Juan, H.-F. and Huang, H.-C.*"Identification of cell states using super-enhancer RNA" BIT2016 and Kyutech-NYMU Joint Symposium for Biomedical Informatics & Biotechnology, Taipei, Taiwan, March 3-4, 2016. (Poster CompetitionHonorable Mention)

※ 專書 Book Chapters

1. Juan, H.-F. (2017) "Data Sources for herbal and traditional medicines" in Computational Systems Pharmacology and Toxicology, Edited by Dale Johnson and Rudy J Richardson (The Royal Society of Chemistry, Cambridge, UK), pp. 243-260.
2. Juan, H.-F. and Huang, H.-C. A Practical Guide to Cancer Systems Biology (World Scientific Publishing, Singapore) (in press)

※ 科普文章

1. 阮雪芬、黃宣誠 (2016). 解析複雜的生命現象—系統生物學. 科學月刊六月號558: 436-441 (封面故事)

賴飛羆教授 Fei-Pei Lai, Professor

※ 學術期刊論文 Journal articles

1. Te-Wei Ho, Jin-Ming Wu, Ching-Yao Yang, ong-Shiee Lai, Feipei Lai, and Yu-Wen Tien, "Total gastrectomy improves glucose metabolism on gastric cancer patients: a nationwide population-based study," Surgery for Obesity and Related Diseases, 2016 March–April; 12(3): 635-641. PMID: 27012876
2. Shyh-Wei Chen, Dai Lun Chiang, Chia-Hui Liu, Tzer-Shyong Chen, , Feipei Lai, Huihui Wang, Wei Wei, "Confidentiality Protection of Digital Health Records in Cloud Computing," Journal of Medical Systems, 2016 April; 40:124. PMID: 27059737
3. Te-Wei Ho, Chun-Ta Huang, Herng-Chia Chiu, Sheng-Yuan Ruan, Yi-Ju Tsai, Chong-Jen Yu, Feipei Lai, and The HINT Study Group, "Effectiveness of Telemonitoring in Patients with Chronic Obstructive Pulmonary Disease in Taiwan-A Randomized Controlled Trial," Scientific Reports, 2016 Mar; 6: 23797.PMID: 27029815
4. Te-Wei Ho, Chun-Ta Huang, Sheng-Yuan Ruan, Yi-Ju Tsai, Feipei Lai, and Chong-Jen Yu, "Diabetes mellitus in patients with chronic obstructive pulmonary disease-The impact on mortality," PLoS One, 2017 April; 12(4): e0175794.PMID: 28410410

※ 研討會論文 Conference & proceeding papers

1. Chia-Tung Wu, Yu-Fen Tzeng, Te-Wei Ho, Shyh-Wei Chen, Bihshya Gau, Feipei Lai, and Hung-Yu Chiu, "A Smart Phone Application in Improving Healthy Lifestyles and Health Outcomes for School-age Children with Asthma," International Symposium on Network Enabled Health Informatics, Biomedicine and Bioinformatics, August 19-20, 2016, San Francisco, USA.

2. Hsueh-Fu Shih, Te-Wei Ho, Jui-Tse Hsu, Chun-Che Chang, Feipei Lai, Jin-Ming Wu, and The WIA Study Group, "Surgical Wound Segmentation Based On Adaptive Threshold Edge Detection and Genetic Algorithm," The 2016 8th International Conference on Graphic and Image Processing (ICGIP 2016), October 29-31, 2016, Tokyo, Japan
3. Jui-Tse Hsu, Te-Wei Ho, Hsueh-Fu Shih, Chun-Che Chang, Feipei Lai, Jin-Ming Wu, and The WIA Study Group, "Automatic Wound Infection Interpretation for Postoperative Wound Image," The 2016 8th International Conference on Graphic and Image Processing (ICGIP 2016), October 29-31, 2016, Tokyo, Japan
4. Te-Wei Ho, Fong-Ci Lin, Ching-Miao Lin, Feipei Lai, "Smart Computing Mechanism for Noise Detection and Elimination in ECG Signal," The 2017 IEEE International Conference on Big Data and Smart Computing (BigComp 2017), February 13-16, 2017, Jeju, Korea
5. Te-Wei Ho, Jin-Ming Wu, Yao-Ting Chang, Chung-Chieh Hsu, Feipei Lai, "A Intelligence Application of Health Information Monitoring and Telehealthcare for Surgical Operations on Elderly Patients," Informatics for Health 2017, April 24-26, 2017, Manchester Central, UK
6. Chun-Ta Huang, Te-Wei Ho, Sheng-Yuan Ruan, Feipei Lai, Chong-Jen Yu, "The Prognostic Role Of Type 2 Diabetes in Patients With Chronic Obstructive Pulmonary Disease," American Thoracic Society 2017, May 19-24, 2017, Washington, USA

呂學一教授 Hsueh-I Lu, professor

※ 學術期刊論文 Journal articles

1. Hung-Chun Liang and Hsueh-I Lu：Minimum Cuts and Shortest Cycles in Directed Planar Graphs via Noncrossing Shortest Paths. SIAM Journal on Discrete Mathematics 31(1)： 454-476 (2017)

孫維仁教授 Wei-Zen Sun, Professor

※ 學術期刊論文 Journal articles

1. Yu-Chang Yeh, Linda Chia-Hui Yu, Chun-Yu Wu, Ya-Jung Cheng, Chen-Tse Lee, Wei-Zen Sun, Jui-Chang Tsai, Tzu-Yu Lin: Effects of Endotoxin Absorber Hemoperfusion on Microcirculation in Septic Pigs. J Surg Res, May 1, 2017;211:242-250. doi: 10.1016/j.jss.2016.12.026.
2. Hsin-Chia Lin, Hao-Pai Lin, Hsin-Hui Yu, Li-Chieh Wang, Jyh-Hong Lee, Yu-Tsan Lin, Yao-Hsu Yang, Wei-Zen Sun*, Bor-Luen Chiang*: Tai-Chi-Chuan Exercise Improves Pulmonary Function and Decreases exhaled nitric oxide level in both Asthmatic and Non-Asthmatic Children and Improves Quality of Life Children with Asthma, Evid Based Complement Alternat Med,2017;2017:6287642. doi: 10.1155/2017/6287642. Epub 2017 Apr 13.
3. Chih-Peng Lin, Kai-Hsiang Kang, Huang-Ju Tu, Ming-Yueh Wu, Tzu-Hung Lin, Houng-Chi Liou, Wei-Zen Sun*, Wen-Mei Fu*:CXCL12/CXCR4 Signaling Contributes to the Pathogenesis of Opioid Tolerance: A Translational Study. Anesth Analg, 124(3):972-9, 2017.
4. Yow-Shan Lee, Wei-Zen Sun*: Epidemiology of anaphylaxis: A retrospective cohort study in Taiwan. Asian J Anesth,Jan 20, 2017.
5. Kuang-Cheng Chan, Jia-Rong Yeh, Wei-Zen Sun*: The role of autonomic dysfunction in Predicting One-Year Mortality after Liver Transplantation. Liver International, Jan 20, 2017.
6. Jim Reynold, Wei-Zen Sun*: Journeys and Journals East and West, Acta Anaesthesiol Taiwan, 54(4):103-105, 2016.
7. I-Wen Su, Fang-Wei Wu, Keng-Chen Liang, Kai-Yuan Cheng, Sung-Tsang Hsieh, Wei-Zen Sun, Tai-Li Chou*: Pain Perception Can Be Modulated: A Resting-state fMRI Study. Frontiers in Human Neuroscience, Nov 10, 10;10:570, 2016.

8. Muammar Sadrawi, Wei-Zen Sun, Mathew M Ma, Chun-Yi Dai, Maysam F Abbod, Jiann-Shing Shieh: Cardiopulmonary Resuscitation Pattern Evaluation Based on Ensemble Empirical Mode Decomposition Filter via Nonlinear Approaches. BioMed Res Inter, 2016;2016:4750643, 2016.
9. Jui-Hung Kao, Fei-pei Lai, Bo-Cheng Lin, Wei-Zen Sun, Kuan-Wu Chang, Ta-Chien Chan: Spatial analysis and data mining techniques for identifying risk factors of Out-of-Hospital Cardiac Arrest. Inter J Inform Manage, May 24, 2016.
10. Jim Reynold, Chen-Hsing Yang, Wei-Zen Sun*: Measuring and Reducing Perioperative Anesthetic-Related Mortality: View from East Asia, Acta Anaesthesiol Taiwan,54(2)41-3, 2016.
11. Albert Y. Chen, Tsung-Yu Lu, H. M. Mathew Ma, Wei-Zen Sun*: Demand forecast using machine learning for the pre-allocation of ambulances, IEEE J Biomed Health Informatics,20(4):1178-87, 2016.
12. Yu-Chang Yeh, Chun-Yu Wu, Ya-Jung Cheng, Chih-Min Liu, Jong-Kai Hsiao, Wing-Sum Chan, Zong-Gin Wu, Linda Chia-Hui Yu, Wei-Zen Sun*, NCMMR: Effect of Dexmedetomidine on Intestinal Microcirculation and Intestinal Epithelial Barrier in Endotoxemic Rats. Anesthesiology, 125(2):355-67, 2016.
13. Ming-Cheng Chang, Chen YL, Chiang YC, Chen TC, Tang YC, Chi-An Chen, Wei-Zen Sun*, Wen-Fang Cheng*: Anti-CD40 Antibody and Toll-like Receptor 3 Ligand Restore Dendritic Cell-mediated Anti-tumor Immunity Suppressed by Morphine. Am J Cancer Res, 6(2):157-72, 2016.
14. Wei-Han Chou, Feng-Sheng Lin, Chih-Peng Lin, Wen-Ying Lin, Jr-Chi Yie, Wei-Zen Sun*: Mirtazapine, in orodispersible form, for pre-operative psychologically distressed patients: a pilot study. Acta Anaesthesiol Taiwan, 54(1)16-23, 2016.
15. Ming-Cheng Chang, Chen YL, Chiang YC, Chen TC, Tang YC, Chi-An Chen, Wei-Zen Sun, Wen-Fang Cheng*: Mesothelin-specific cell-based vaccine generates antigen-specific immunity and potent anti-tumor effects by combining with IL-12 immunomodulator. Gene Ther, 23(1):38-49, 2016.

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1. 孫維仁：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。台灣地理資訊學會年會暨學術討會, July 4, 2017
2. Jiann-Shing Shieh, Muammar Sadrawi, Wei-Zen Sun, Matthew Huei-Ming Ma, Maysam F. Abbod: The Evaluation of the Fuzzy C-Mean and Random Classifications for the Unbalanced Data in the Emergency Medical System via Artificial Neural Networks.2017 World Conference on Innovation, Engineering, and Technology (IET 2017), Kyoto, Japan, June 27-9, 2017.
3. Wei-Zen Sun: Soreness across east and west medicine (plenary lecture). 2017 Congress of Chinese Society of Integrative Anesthesiology (ICMLC), Xiaan, Jun 22-5, 2017.
4. Wei-Zen Sun, Ming-Yu Lo: Assessing acupuncture effect on migraine: the role of dynamic biomarker for cerebral and muscular microcirculation (Plenary Lecture).The Second International Taiwanese Congress of Neurology (2nd ITCN), 2017 Annual Meeting of Taiwan Neurological Society (2017 AMTNS), May 19, 2017.
5. Wei-Zen Sun: Treatment of diabetic peripheral neuropathic pain in Taiwan (plenary lecture). 38th Annual Meeting of the Endocrine Society and the Diabetes Association of ROC (Taiwan), April 8-9, 2017.
6. 孫維仁：跨越中西藩籬的痠痛感--從纖維肌痛症、針刺得氣、到控酸離子通道的分子遺傳機制研究(大會演講)。台北國際中醫藥學數論壇, 2017 Taipei Traditional Chinese Medicine International Forum, Taiwan, s73, March 12, 2017.
7. 孫維仁：結合醫學、運動、政府、產業的人力培訓藍圖(大會演講), 2017 OlympiCare Forum, Taipei, Taiwan, March 11, 2017.

8. 孫維仁：臺灣疼痛專科醫師在健保制度下的角色(大會演講), 2017 Annual Congress of Taiwan Pain Society, Taipei, Taiwan, March 4, 2017.
9. Jr-Chi Ye, Chih-Peng Lin, Wei-Han Chou, Wen-Ying Lin, Feng-Sheng Lin, Wei-Zen Sun: An anesthesiologist in the community medicine: share of our experience in NTUH Jin-Shan branch. 2017 Annual Congress of Taiwan Pain Society, Taipei, Taiwan, March 4, C19, 2017.
10. Chih-Fan Chen, Yi-Shiuan Lin, Wei-Han Chou, Cheng-Yuan Hsieh, Jr-Chi Ye, Chih-Peng Lin, Wen-Ying Lin, Feng-Sheng Lin, Wei-Zen Sun: Satisfaction of patient controlled epidural analgesia after cesarean section. 2017 Annual Congress of Taiwan Pain Society, Taipei, Taiwan, March 4, B06, 2017.
11. 孫維仁：超聲如何推動台灣麻醉的典範轉移(大會演講)。2016超聲技術在麻醉科的應用, 福州, 中國，Dec 30, 2016.
12. 孫維仁：圍術期鎮痛治療的衛生經濟學(大會演講)。2016第一屆圍術期多學科疼痛管理高峰論壇, Beijing, China, Nov 27, 2016.
13. Wei-Zen Sun: 麻醉醫師職業生涯規劃(大會演講)。2016 Annual Congress of Taiwan Society of Anesthesiologists, Taipei, Taiwan.
14. 孫維仁：新世代自控式止痛裝置-- 我們的研發理念和創新(大會演講)。2016 Annual Congress of Taiwan Society of Anesthesiologists, Taipei, Taiwan.
15. Chih-Fan Chen, Jr-Chi Yeh, Wei-Han Chou, Chih-Peng Lin, Wen-Ying Lin, Feng-Sheng Lin, Wei-Zen Sun: PainDETECT questionnaire for neuropathic pain after burn injury (one-year follow-up). 2016 Annual Congress of Taiwan Society of Anesthesiologists, Taipei, Taiwan.
16. Yi-Chun Chen, Tzu-Su Wang, Wei-Zen Sun: Effect of menopause on post-operative cognitive dysfunction in midlife women. 2016 Annual Congress of Taiwan Society of Anesthesiologists, Taipei, Taiwan.
17. Wei-Zen Sun: A novel role of ketorolac in multimodal analgesia. (Plenary Lecture) 兩岸重症麻醉新進展學習班南京, July 2, 2016.
18. Wei-Zen Sun: Cerebral hemodynamic measurement as a powerful dynamic biomarker for acupuncture research in migraine headache. 2016 Congress of Chinese Society of Integrative Anesthesiology (ICMLC), Chengchou, Jun 24, 2016.
19. 孫維仁：重大公共安全緊急救護系統。台灣安全研究與教育學會，Jun 22, 2016
20. Wen-Ying Lin, Yu-Hsin Huang, Wen-Hua Chu, Chen-Tung Yen, Wei-Zen Sun: Positron emission tomography of supraspinal antinociceptive modulation in rat neuropathic and cancer-induced bone pain models. 2016 Annual Congress of Taiwan Pain Society, Taipei, Taiwan.
21. Wei-Zen Sun: Next-generation PCA pump: Our innovation and design (Plenary Lecture), 2016 Annual Congress of Taiwan Pain Society, Taipei, Taiwan.
22. Jhe-Nan Lin, Wei-Zen Sun, Meng-Han Yang: Analyzing Seasonal Incidence Patterns of Epileptic Seizure Using Various Statistical Methods. International Conference of Machine Learning and Cybernetics (ICMLC), Hong Kong, 2016.
23. 孫維仁：從傳統武術到健康促進-太極拳的應用。Active approach to musculoskeletal pain. 台灣脊骨矯治醫學會，May-01-2016

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1. 許惠恒、王署君、王治元醫師、朱志勳、李奕德、杜思德、孫維仁、張鳴宏、郭清輝、陳榮福、黃禹堯 (台灣糖尿病周邊神經病變工作小組Taiwan Diabetic Peripheral Neuopathic Pain Advisory Board)合著: Taiwan Clinical Guideline for Diabetic Peripheral Neuropathy 台灣糖尿病周邊神經病變臨床指引。台灣糖尿病醫學會出版，1st ed, pp1-97, 2017.
2. 黃安年、孫維仁、余廣亮:末期疾病疼痛治療之新觀念及進展。IN: 黃安年:末期疾病疼痛治療學(Pain Management for Terminal Diseases, ISBN 978-986-126-924-5)，台灣安寧緩和醫學學會, 3rd ed, pp1-42, 2016.
3. Jui-Hung Kao, Feipei Lai, Bo-Cheng Lin, Wei-Zen Sun, Kuan-Wu Chang, Ta-Chien Chan: Application of Cloud Computing for Emergency Medical Services: A Study of Spatial Analysis and Data Mining Technology. IN: Frontier Computing, Chapter 88, 2016.

曾宇鳳教授 Y. Jane Tseng,Professor

※ 學術期刊論文 Journal articles

1. Chang, C. H., Chung, C. H., Tu, Y. S., Tsai, C. C., Hsu, C. C., Peng, H. C., Tseng, Y. J.*, Huang, T. F. (2017) Trowaglerix venom polypeptides as a novel antithrombotic agent by targeting immunoglobulin-like domains of Glycoprotein VI in Platelet. Arteriosclerosis Thrombosis And Vascular Biology, 37, 1307-1314 (IF=5.969, Ranking = 4/63, 6%, Category: Peripheral Vascular Disease)
2. Chao, H. C., Chen, G. Y., Hsu, L. C., Liao, H. W., Yang, S. Y., Wang, S. Y., Li, Y. L., Tang, S. C., Tseng, Y. J., Kuo C. H. (2017) Using precursor ion scan of 184 with liquid chromatography-electrospray ionization-tandem mass spectrometry for concentration normalization in cellular lipidomic studies. Analytica Chimica Acta, 971, 68-77 (IF=4.712, Ranking = 8/75, 11%, Category: Chemistry, Analytical)
3. Lee, M. Y., Lin, Y. R., Tu, Y. S., Tseng, Y. J., Chan, M. H., Chen, H. H. (2017) Effects of sarcosine and N, N-dimethylglycine on NMDA receptor-mediated excitatory field potentials. Journal of Biomedical Science , 24(1), 18-28 (IF=2.935, Ranking = 45/124, 36%, Category: Medicine, Research & Experimental)
4. Shen, C. Y., Kuo, C. .H.. Wang, S. Y., Yang, W. Q., Kuo, C. T., Tseng, Y. J. *, Tsai , M. H. (2016) Distinct metabolic changes in human lung cancer cells with differential radiation sensitivities. Translational Cancer Research, 5(6), 738-747 (IF=1.757, Ranking = 166/213, 78%, Category: Oncology)
5. Hsieh, P. L., Tseng, C. H., Tseng, Y. J., Yang W. S.(2016). Resistance Training Improves Muscle Function and Cardiometabolic Risks But Not Quality of Life in Older People With Type 2 Diabetes Mellitus: A Randomized Controlled Trial. Journal of Geriatric Physical Therapy, 00:1-12(IF=1.833, Ranking = 16/65, 25%, Category: Rehabilitation)
6. Tian, T. F., Wang, S. Y., Kuo, T. C., Tan, C. E., Chen, G. Y., Kuo, C. H., Chen, C. H., Chan, C. C., Lin, O., Tseng, Y. J.* (2016) A Web Server for Peak Detection, Baseline Correction and Alignment in Two-dimensional Gas Chromatography Mass Spectrometry-based Metabolomics Data. Analytical Chemistry, 88(21), 10395-10403 (IF=5.886, Ranking = 4/75, 5%, Category: Chemistry, Analytical)
7. Huang, S. W.; Kuo, H. L.; Hsu, M. T.; Tseng, Y. J.; Lin, S. W.; Kuo, S. C.; Peng, H. C.; Lien, J. C.; Huang, T. F.(2016). A novel thromboxane receptor antagonist, nstpbp5185, inhibits platelet aggregation and thrombus formation in animal models. Thrombosis and haemostasis, 116 (IF = 4.984, Ranking=10/68, 14% Category: Hematology)
8. Tzeng, T. H., Kuo, C. Y., Wang, S. Y., Huang, P. K., Huang, Y. M., Hsieh, W. C., Huang, Y. J., Lee, S. C., Tian, W. C., Lu, S. S., Tseng, Y. J. (2016). A Portable Micro Gas Chromatography System for Lung Cancer Associated Volatile Organic Compound Detection. IEEE Journal of Solid-State Circuits, 51(1), 259-272. (IF=3.299, Ranking = 23/257, 8%, Category: Engineering, Electrical & Electronic)
9. Hsu, K.-H.; Su, B.-H.; Tu, Y.-S.; Lin, O. A.; Tseng, Y. J*(2016). Mutagenicity in a Molecule: Identification of Core Structural Features of Mutagenicity Using a Scaffold Analysis. PloS one, 11, e0148900. (IF=3.234, Ranking=9/57, 15% Category: Multidisciplinary sciences)

※ 研討會論文 Conference & proceeding papers

1. Wang, S. Y., Tseng, Y. J.*, Tseng, T. H., Kuo, C. Y., Huang, P. K., Huang, Y. M., Hsieh, W. C., Huang, Y. J., Kuo, P. H., Yu, S. A., Tian, W. C., Lee, S. C., and Lu, S.-S., "Lung Cancer Associated Volatile Organic Compounds Detection Using a Novel Portable Gas Chromatographic Device Integrated MEMS and CMOS Technology," 12th International Conference of the Metabolomics Society, Dublin, Ireland, June 27-30. 2016.
2. Tseng, Y. J., Scaffold analysis of Ames mutagenicity, 251th ACS National Meeting & Exposition, San Francisco, San Diego, March. 13-17. 2016.

捌 教師得獎、專利及技術轉移
Award、patents and Technology Transfer

一、教師得獎

Award

※ 2017

1. 莊曜宇，國立臺灣大學電資學院106年學術貢獻獎，2017。
2. 曾宇鳳，國立臺灣大學電資學院106年學術貢獻獎，2017。
3. 李百祺，第15屆有庠科技講座 (Y. Z. HSU SCIENCE AWARD)，2017。
4. 李百祺，神基講座教授 (Getac Chair)，2017。
5. 孫啟光，106年度瑞軒科技講座主持人，2017。

※ 2016

1. 莊曜宇，國立臺灣大學105年校內服務優良獎，2016。
2. 李百祺，神基講座教授(Getac Chair)，2016。
3. 黃念祖，第十六屆旺宏金矽獎優勝獎，2016。
4. 呂學一，臺大教學傑出獎，2016。
5. 鍾孝文，臺大教學優良獎，2016。
6. 張家禎、陳震宇、莊琮亮、吳子珩、魏淑鈔、廖洪恩、林啟萬，臺灣化學感測器科技協會105年度傑出論文獎，2016。
7. 林致廷，臺灣化學感測器科技協會年度最佳論文獎，2016。
6. 林致廷，旺宏金矽獎優勝，2016。
7. 周迺寬，教育部與所屬機關 (構) 學校105年模範公務人員，2016。
8. 曾宇鳳，諾華創投導師計畫，2016。
9. 曾宇鳳，第13屆國家新創獎，2016。
10. 曾宇鳳，景康青年教師獎，2016。
11. 陳志宏，傑出技術移轉貢獻獎，2016。
12. 林發暄，臺大教學優良獎，2016。

※ 2015

1. 楊泮池，美國國家發明家學會(NAI)院士，2015。
2. 林啟萬，科技部103年度傑出特約研究員獎，2015。
3. 陳志宏，103年度國家發明創作獎～發明獎銀牌，2015。
4. 李百祺，SPIE Fellow, 2015.
5. 林致廷，科技部吳大猷先生紀念獎。

6. 林致廷，臺灣化學感測器科技協會年度最佳論文獎，2015。
7. 林致廷，國家晶片系統設計中心優良晶片特別設計獎，2015。
8. 林致廷，國家晶片系統設計中心優良晶片特優設計獎，2015。
9. 林致廷，國家晶片系統設計中心優良晶片優等設計獎，2015。
10. 林致廷，旺宏金矽獎優勝，2015。
11. 曾宇鳳，2015 IBM Faculty Award，2015。
12. 曾宇鳳教授、田維誠教授、李嗣涔教授與呂學士教授實驗室，2015優良晶片特別設計獎，2015。
13. 曾宇鳳，2015老藥新用獎，2015。
14. 呂學一，灣大學教學優良獎，2015。
15. 莊曜宇，The 5th Excellent Research Award on Breast Cancer, Taiwan BreastCancer Foundation。
16. 田維誠，旺宏金矽獎應用組最佳指導教授獎，2015。
17. 田維誠，青年論文獎，2015。
18. 阮雪芬，2015 Emerging Information and Technology Association (EITA) Service Award，2015。

※ 2014

1. 李百祺，TBF生技講座財團法人台灣生技發展基金會 (Taiwan Bio-development Foundation)，2014。
2. 孫啟光，「第十二屆有庠科技講座-光電科技類」得主，2014。
3. 林發暄，芬蘭傑出教授獎，芬蘭國家科學院，2010-2014。
4. 莊曜宇，國立臺灣大學學術研究績效獎，2014。
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