Taiwan
Instrument
Research
Institute

TAIWAN INSTRUMENT
TIRI est. 1968

2019
ANNUAL
REPORT

儀科中心 108 年報

NARLabs 國家實驗研究院
台灣儀器科技研究中心
Taiwan Instrument Research Institute

2019 ANNUAL REPORT

儀科中心 108 年報

2019 年儀科中心年報
TIRI Annual Report 2019

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主任的話
Words from Director General

　　回顧 2019 年，最值得與各界先進分享的好消息就是我們正式更名了！在全體同仁共識及努力下，儀科中心於 2019 年 3 月 1 日將滿 45 週年前夕，正式更名為國家實驗研究院「台灣儀器科技研究中心」，英文名稱為 Taiwan Instrument Research Institute, National Applied Research Laboratories (TIRI, NARLabs)，更能彰顯本中心在國際儀器科技領域的能見度與影響力，以及國家級研究機構的地位。

　　儀科中心同時於 9 月 11 日舉辦 45 週年慶與更名慶祝活動，以展示廳 (Showroom) 的形式展示近期中心領先國際、台灣第一的研發成果，產學研界 300 餘人齊聚一堂為儀科中心「慶生」，盛況空前！當日研發成果展示豐富，包含配合國家政策推動高階關鍵儀器設備之自主研發與應用，發表國內第一台自製之曝光機系統與國際領先之原子層蝕刻 (ALE) 設備；深入了解產業需求，力助國內產業升級所開發之世界首創晶圓級氣體感測器高效能點測系統；協同學術界開發實現前瞻研究所需之特用實驗儀器設備，如高光譜儀、生醫光電儀器設備及原子層沉積 (ALD) 設備；配合國家太空計畫，儀科中心發展自主化光學遙測酬載成果；亦展現了人文與科技跨域整合之創新浮空投影技術等重要成果。再再顯示儀科中心與時俱進，建立我國獨特的光機電系統整合與儀器技術工程平台，提供各界特殊性、系統性與前瞻性儀器設備開發及完整的技術服務。

　　除此之外，儀科中心首創國際醫療器材認證一站式服務平台，2019 年輔導國內研發團隊申請國際認證及產品上市許可成績斐然，如成功輔導新創公司開發出高技術含量的「椎體撐開器」，成為國內首家自主研發「椎體撐開器」取得台灣 TFDA 許可上市的醫療器材製造商；儀科中心攜手新創公司，合作開發「快篩卵巢癌細胞生醫檢測平台」，使卵巢癌早期篩檢技術有重大突破，讓該公司獲得 3 年 20 億元採購訂單；協助生技公司所開發之腦部手術導航系統，順利取得國際醫材標準 ISO13485 驗證，更為全台中高風險醫材成功通過之首例。

　　儀科中心鏈結國際標竿機構，2019 年在國際合作上亦有亮眼成績，與日本 Edgecross 聯盟 (ECC) 簽署合作備忘錄，共同推動智慧製造場域設備與雲端資料蒐集介面之標準化，提升國內機聯網研發能量；與國際夥伴新加坡國家增材製造創新中心 (NAMIC) 持續進行 3D 列印醫材及臨床應用研究，深化產學研醫合作腳步，引領亞洲 3D 列印醫療產業前進；儀科中心與泰國國家科技發展局 (NSTDA) 亦將進行精準醫療計畫合作，為國研院第一個具體落實的研究案。此外，極力推動國際學術活動與技術交流，與國內相關領域學者組團共赴紐西蘭奧克蘭參加 IEEE IMS 學會年度旗艦型國際研討會 I2MTC，發表科技研發成果並參與學會核心會議研商重要議題，充分發揮國際影響力。

　　儀科中心擁有真空、光學與光機電整合等豐厚技術能量，經過 45 年的研發及技術累積，是全國唯一提供跨領域客製前瞻儀器設備的國家級科技研發單位，具備高階非球面元件完整產線、最全面的真空光學鍍膜技術及設備開發，以及國際級醫療器材認證一站式服務平台。長年來儀科中心扮演「學研後盾、產業推手及國際合作好夥伴」關鍵角色，2020 年儀科中心將持續帶領台灣儀器科技的研發，開發最先進之關鍵元件、組件與系統，秉持「創新精進技術、技術精進服務」的原則與精神，與產、學、研各方進行合作交流與整合，推展各項研發與服務，打造儀器設備自研自製的築夢平台！

　　Looking back on 2019, the best news worth sharing with all friends was that we officially changed our name! With the support and efforts of all colleagues, Instrument Technology Research Center changed its name to **"Taiwan Instrument Research Institute, National Applied Research Laboratories (TIRI, NARLabs)" on March 1, 2019**, just before its 45th anniversary. The new name can better demonstrate the global visibility and influence in the field of instrument science and technology as a national research institution.

　　TIRI also celebrated its 45th anniversary and held a renaming ceremony on September 11. A showroom was presented to demonstrate the leading technology in world-class research and development achievements. More than 300 people from various industries, universities, and academia gathered together to celebrate TIRI's "birthday". The celebration is an unprecedented grand event. On that day, an abundant amount of R&D achievements was displayed, including Taiwan's first self-produced stepper and the world-leading atomic layer etching (ALE) equipment that was released to promote independent research, development, and application of advanced key instruments and equipment in cooperation with government policies; the world's first "High-throughput Wafer-level Probing System for Micro Gas Sensors" developed to better meet industrial demand and assist in Taiwan's industrial upgrading; the special experimental instruments and equipment developed for prospective studies by cooperating with the academia and university, such as hyper-spectrometer, biomedical photoelectric instrument, and atomic layer deposition (ALD) equipment; the optical remote sensing results independently developed by TIRI in cooperation with the national space

program; and the innovative "Floating Image Projection" technology integrating humanities and technology. These examples also show that TIRI has kept pace with the times, built up Taiwan's unique opto-electromechanical system integration and instrument technology engineering platform, and provided special, systematic, and perspective instruments and equipment as well as complete technical services for all circles.

TIRI first established a one-stop service platform for international medical device certification in Taiwan. In 2019, TIRI made brilliant achievements in guiding Taiwan's research and development teams to apply for international certification and product marketing authorization. For example, TIRI successfully assisted a start-up company to develop a high-tech "vertebral body augmentation system" and to become the first listed vertebral body augmentation system manufacturer licensed by TFDA in Taiwan. TIRI also worked with another start-up firm to jointly develop a "biomedical testing platform for ovarian carcinoma cell rapid screening", making a great breakthrough in the early screening of ovarian cancer and obtaining a 3-year NT$2 billion purchase order for the company. The navigation system for brain surgery developed by a biotechnology company with the assistance of TIRI was successfully verified by the international medical device standard ISO13485 and was the first successful high-risk medical device to be certified in Taiwan.

TIRI maintains strong relationships with top international benchmark institutes and has achieved outstanding results in international cooperation in 2019. TIRI signed a cooperation memorandum with Japan

Edgecross Alliance (ECC) to jointly promote the standardization of intelligent manufacturing field equipment and cloud data collection interface and to improve Taiwan's research and development capacity of Internet of Machines. TIRI continues to partner with Singapore's National Additive Manufacturing Innovation Cluster (NAMIC) to conduct studies on 3D printing medical devices and clinical applications, to deepen the cooperation with industry, university, research, and medicine leading the advancement of 3D printing medical industry in Asia. TIRI and Thailand's National Science and Technology Development Agency (NSTDA) will also collaborate on a precision medicine program that is the first study specifically carried out by the National Applied Research Laboratories. In addition, TIRI is aggressively promoting international academic activities and technical exchanges. TIRI formed a delegation with Taiwan's scholars in relevant fields to attend I2MTC, the annual flagship international seminar of IEEE IMS in Auckland, New Zealand, published technical research and development achievements, and participated in the institute's caucus to discuss important issues, so as to fully exert our international influence.

TIRI owns powerful and diverse technical capacity in vacuum, optics, and opto-electromechanical integration. With 45-year experience, TIRI is the only national technology research and development institute providing cross-field customized advanced instruments and equipment in Taiwan. Moreover, TIRI is equipped with a complete production line of advanced aspheric components, the most comprehensive development of vacuum optical coating technology and equipment, and a one-stop service platform for international medical device certification. Over the years, TIRI has played the roles as the "strong supporter to academic and research institutes, key driver of industrial growth and reliable partner for international cooperation". In 2020, TIRI will continue to be a leading provider of instrument technology research and development to domestic industry and research communities and to build up the most advanced key components, parts, and systems. Adhering to the principle and spirit of "Innovation promotes technology and technology promotes services", TIRI will cooperate, communicate, and integrate with industries, academia, and research institutes to promote research & development and services, and to create an ideal platform for domestic development of instruments and equipment.

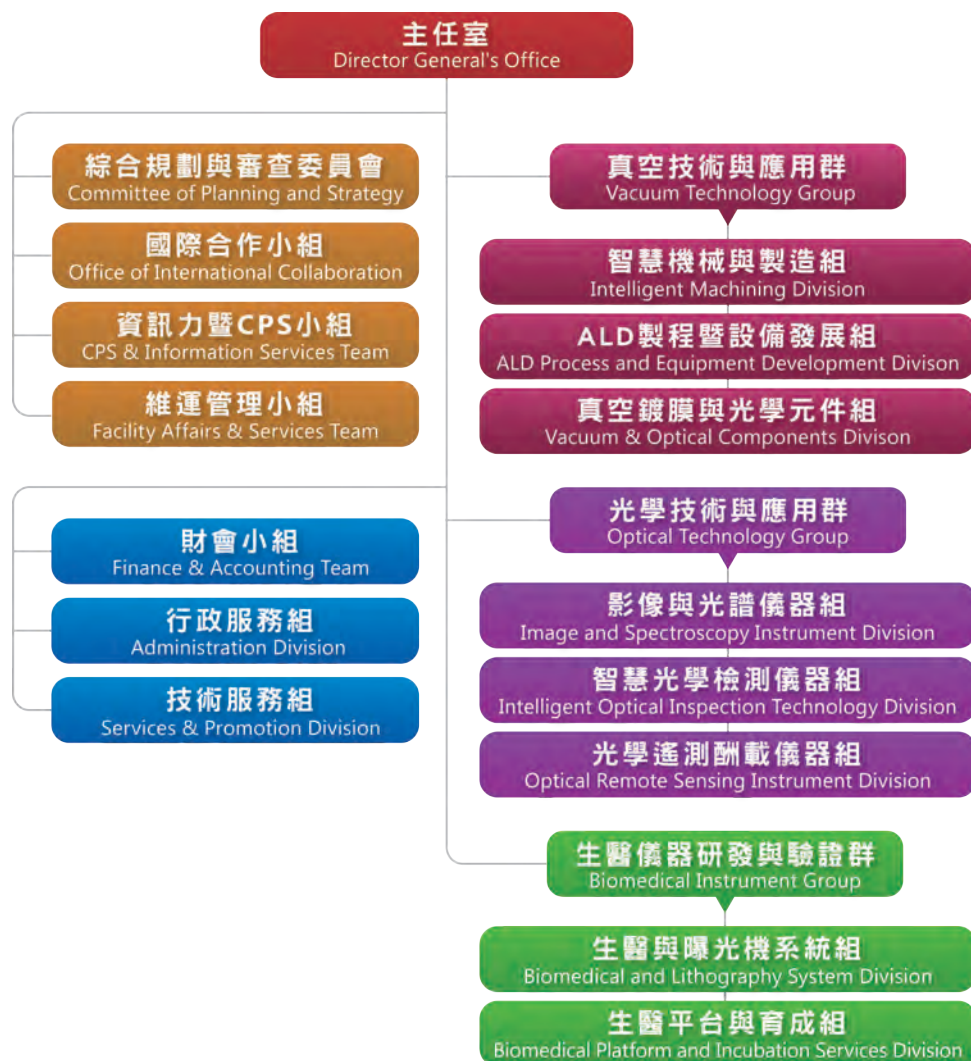主任 Director General 楊燿州

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基本概況
Overview of TIRI

組織架構 Organization Chart

主任室
Director General's Office

綜合規劃與審查委員會
Committee of Planning and Strategy

國際合作小組
Office of International Collaboration

資訊力暨CPS小組
CPS & Information Services Team

維運管理小組
Facility Affairs & Services Team

財會小組
Finance & Accounting Team

行政服務組
Administration Division

技術服務組
Services & Promotion Division

真空技術與應用群
Vacuum Technology Group

智慧機械與製造組
Intelligent Machining Division

ALD製程暨設備發展組
ALD Process and Equipment Development Division

真空鍍膜與光學元件組
Vacuum & Optical Components Division

光學技術與應用群
Optical Technology Group

影像與光譜儀器組
Image and Spectroscopy Instrument Division

智慧光學檢測儀器組
Intelligent Optical Inspection Technology Division

光學遙測酬載儀器組
Optical Remote Sensing Instrument Division

生醫儀器研發與驗證群
Biomedical Instrument Group

生醫與曝光機系統組
Biomedical and Lithography System Division

生醫平台與育成組
Biomedical Platform and Incubation Services Division

人力配置 Deployment of Manpower

研究人員
Researcher

博士 Ph.D. **48**　碩士 M.S. **82**　學士 B.S. **32**　其他 Other **10**

90

工程人員
Engineer
35

技術人員
Technician
19

行政人員
Administration staff
28

總人數 total **172** 人

核心設施 Core Facilities
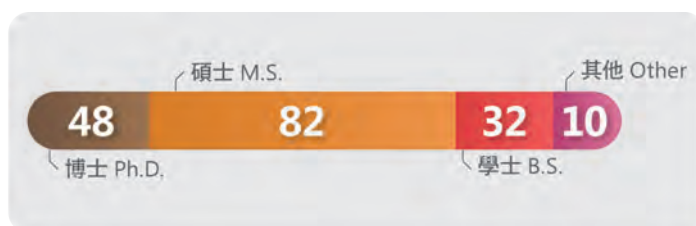
(1) 精密光機工程 Precision Opto-mechanical Engineering

　　超過 45 年精密光學製造技術，提供精密光機元件及系統設計製作服務，為國內唯一可提供大口徑非球面鏡面加工的單位。

　　Having accumulated 45 years of experience in precision optics and machining, TIRI provides precision opto-mechanical device and system design & manufacturing services. We are the only organization that can provide fabricating service for meter-scale aspheric optics in Taiwan. Our core facilities include:

◆ 超精密鑽石車削輪磨機 Single Point Diamond Turning, SPDT
◆ 大口徑 CNC 拋光與檢測設備 Meter-scale CNC Polishing and Inspection
◆ 磁流體拋光機 Magnetorheological Finishing, MRF
◆ 非球面拼接式干涉儀 Aspheric Stitching Interferometric Inspection, ASI
◆ 超高精度三次元輪廓機 Ultrahigh Accurate 3-D Profilometer, UA3P
◆ 車削定心機 Turning Centering Machine
◆ 鏡面自由曲面超精密加工 Freeform Ultra Precision Maching System
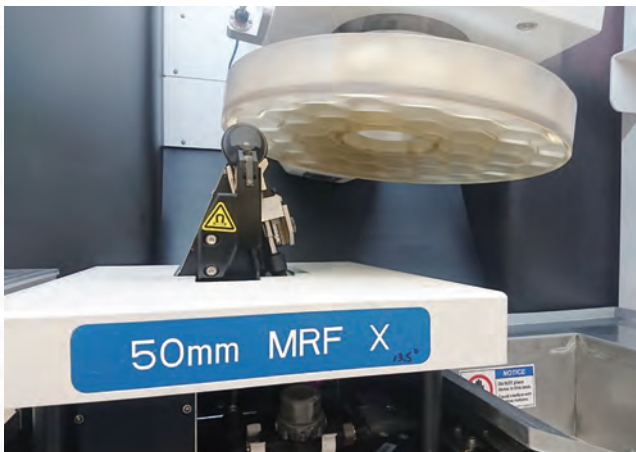
(2) 真空技術 & 薄膜製程 Vacuum Technology & Thin Film Process

　　儀科中心為國內真空技術發源地，專注於先進薄膜製程技術與系統開發，以及真空系統檢校技術，提供先進真空系統開發、薄膜製程發展及檢校服務平台。

　　TIRI is the origin of domestic vacuum technology. TIRI provides advanced vacuum system development, thin-film process development, and inspection/ calibration service platforms; our major core facilities include：

◆ 電漿輔助原子層沉積系統 Plasma-Enhanced Atomic Layer Deposition, PE-ALD
◆ 金屬有機化學氣相沉積系統 Metal Organic Chemical Vapor Phase Deposition, MOCVD
◆ 深紫外波段光學鍍膜系統 Deep UV Optical Coating System
◆ 大口徑鏡片鍍膜系統 Meter-scale Optical Coating System
◆ 脈衝雷射蒸鍍系統 Pulsed Laser Deposition, PLD
◆ 高功率脈衝磁控濺射系統 High Power Impulse Magnetron Sputtering, HiPIMS
◆ 離子源輔助磁控濺射系統 Magnetron Sputtering with Ion-assisted Deposition
◆ 離子束輔助電子槍蒸鍍系統 E-gun with Ion-assisted Deposition
◆ 像差修正掃描穿透式電子顯微鏡 Aberration Corrected Scanning Transmission Electron Microscope, STEM

(3) 生醫科技研發環境建置 Medical Device Testing & Verification Laboratories

儀科中心於新竹生醫園區建置及維運共通核心實驗室、產品檢測驗證實驗室，並提供醫療器材法規加值、管理系統整合，輔導品質系統建置、輔導申請產品上市許可（歐盟、美國等國家）等軟體服務，主要核心設施包括以下：

TIRI established and maintained the Medical Device Testing & Verification Laboratories in Hsinchu Biomedical Science Park, which conform to international medical device regulations. The laboratories provide one-stop shop service to accelerate the medical product launch. The major core facilities include:
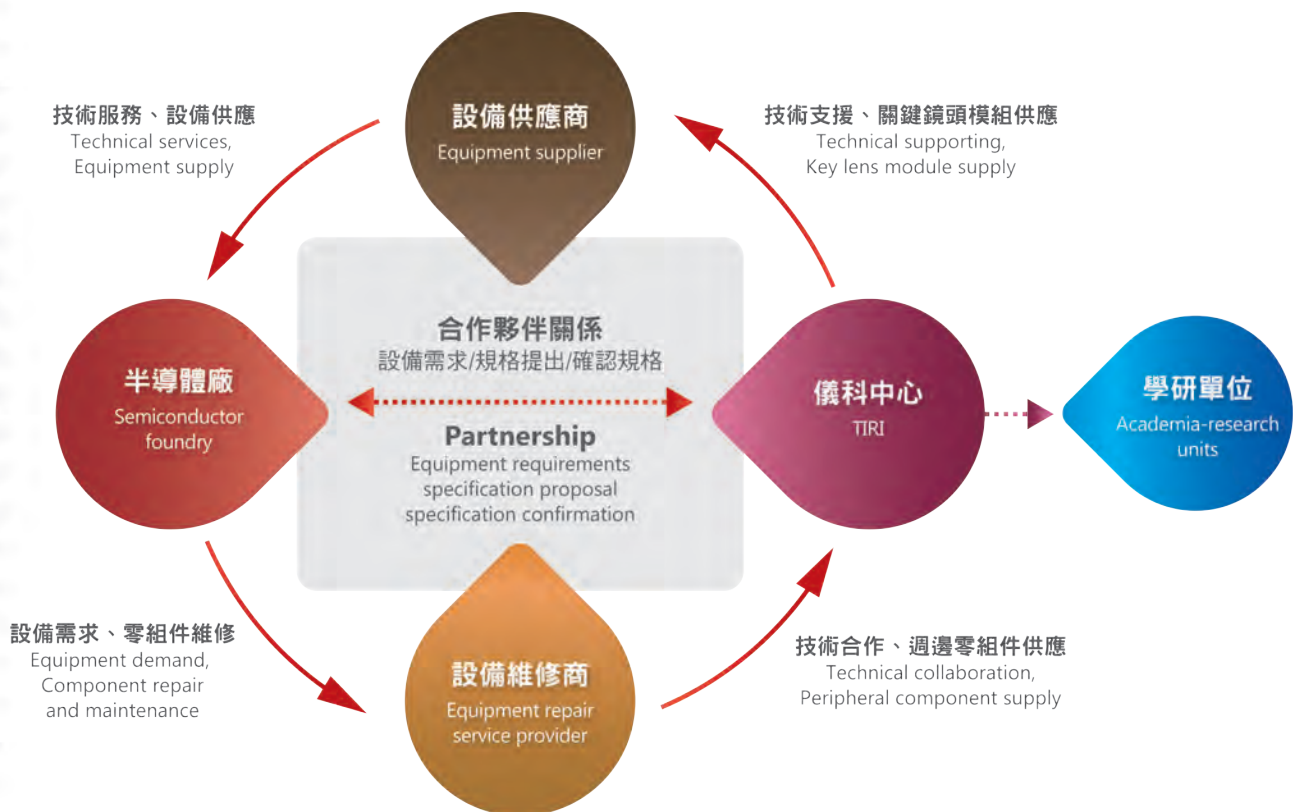
◆ 金屬材料原型打樣系統 Metallic Material Additive Manufacture System
◆ 生醫複合材料打樣系統 Polymer Material Additive Manufacture System
◆ 生物力學材料試驗機 Biomechanics Material Testing Machine
◆ 生物晶片表面改質系統 Biochip Surface Modification System
◆ 生物分子交互作用分析系統 Bio-molecular Interaction Analysis System
◆ 高分子醫療輔具原型打樣系統 Polymer Material Additive Manufacture System
◆ C-arm X 造影系統 Medical C-arm X-ray Imaging System
◆ 3T 磁振造影系統 3-Tesla Medical Magnetic Resonance Imaging System
◆ 128 切電腦斷層掃描系統 128-slice Medical Computed Tomography Imaging System
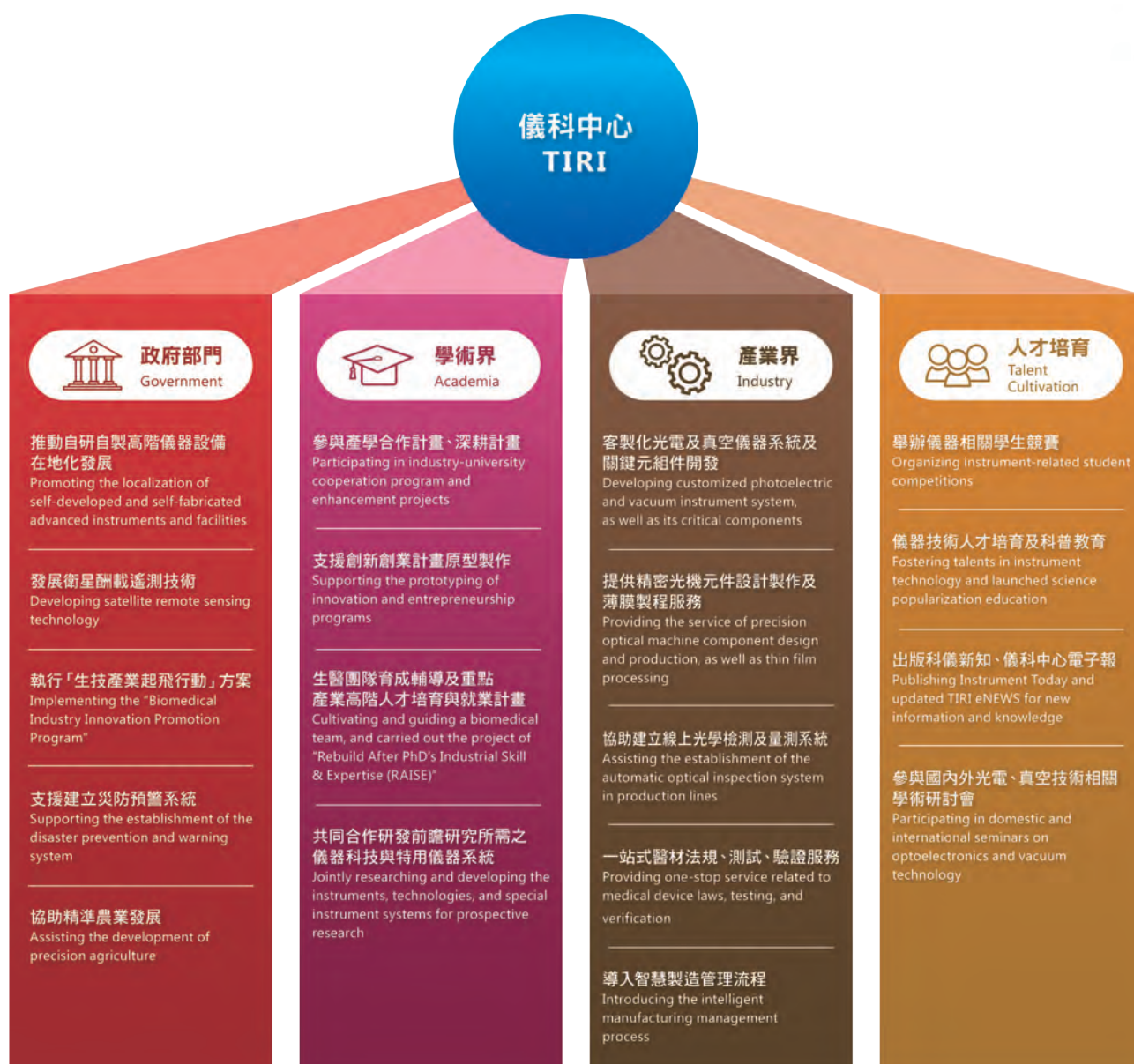
商業合作模式 Business Cooperation Model

　　儀科中心積極導入「服務客戶的客戶」新營運模式，銜接上下游廠商間的產品供需、或學研間的研發落差，將消費者端的需求，研發並轉譯成供應者的能量；並藉由「創新精進技術、技術精進服務」理念，加速研發創意轉化成產業應用，擴大產業鏈的服務加值效益。下圖以半導體廠為例，所進行的營運模式。

　　TIRI actively introduces a new operating model of "servicing customers of customers", and bridges the gap between the product supply and demand of upstream and downstream firms as well as in the R&D of academic institutions to research, develop, and translate the demands at the consumer end into capacities at the supplier end. Tapping on the novel service concept of "Drive Technology Innovation to Promote Academic Research", TIRI accelerates the transformation of R&D and innovative outcomes into industry applications, thereby adding value to the services of domestic industry chain. The diagram below illustrates the operating model of a semiconductor factory.

技術服務、設備供應
Technical services, Equipment supply

設備供應商
Equipment supplier

技術支援、關鍵鏡頭模組供應
Technical supporting, Key lens module supply

半導體廠
Semiconductor foundry

合作夥伴關係
設備需求/規格提出/確認規格
Partnership
Equipment requirements specification proposal specification confirmation

儀科中心
TIRI

學研單位
Academia-research units

設備需求、零組件維修
Equipment demand, Component repair and maintenance

設備維修商
Equipment repair service provider

技術合作、週邊零組件供應
Technical collaboration, Peripheral component supply

主要服務面向 Main Services

◆ 執行重大政策任務 Executing crucial policy tasks (Government)
◆ 支援重要學術計畫 Supporting major academic projects (Academia)
◆ 新技術（產業）商品化 Commercializing novel technologies (Industry)
◆ 推動科普教育 Promoting science popularization education (Talent Cultivation)

儀科中心
TIRI

政府部門 Government

推動自研自製高階儀器設備在地化發展
Promoting the localization of self-developed and self-fabricated advanced instruments and facilities

發展衛星酬載遙測技術
Developing satellite remote sensing technology

執行「生技產業起飛行動」方案
Implementing the "Biomedical Industry Innovation Promotion Program"

支援建立災防預警系統
Supporting the establishment of the disaster prevention and warning system

協助精準農業發展
Assisting the development of precision agriculture

學術界 Academia

參與產學合作計畫、深耕計畫
Participating in industry-university cooperation program and enhancement projects

支援創新創業計畫原型製作
Supporting the prototyping of innovation and entrepreneurship programs

生醫團隊育成輔導及重點產業高階人才培育與就業計畫
Cultivating and guiding a biomedical team, and carried out the project of "Rebuild After PhD's Industrial Skill & Expertise (RAISE)"

共同合作研發前瞻研究所需之儀器科技與特用儀器系統
Jointly researching and developing the instruments, technologies, and special instrument systems for prospective research

產業界 Industry

客製化光電及真空儀器系統及關鍵元組件開發
Developing customized photoelectric and vacuum instrument system, as well as its critical components

提供精密光機元件設計製作及薄膜製程服務
Providing the service of precision optical machine component design and production, as well as thin film processing

協助建立線上光學檢測及量測系統
Assisting the establishment of the automatic optical inspection system in production lines

一站式醫材法規、測試、驗證服務
Providing one-stop service related to medical device laws, testing, and verification

導入智慧製造管理流程
Introducing the intelligent manufacturing management process

人才培育 Talent Cultivation

舉辦儀器相關學生競賽
Organizing instrument-related student competitions

儀器技術人才培育及科普教育
Fostering talents in instrument technology and launched science popularization education

出版科儀新知、儀科中心電子報
Publishing Instrument Today and updated TIRI eNEWS for new information and knowledge

參與國內外光電、真空技術相關學術研討會
Participating in domestic and international seminars on optoelectronics and vacuum technology

Taiwan
Instrument
Research
Institute

亮點成果
與大事紀要

Notable Achievements
& Milestones in 2019

TAIWAN INSTRUMENT
TIRI est. 1968

0564

NARLabs 國家實驗研究院
台灣儀器科技研究中心
Taiwan Instrument Research Institute

2019/03/01

國研院儀科中心正式更名為國家實驗研究院「台灣儀器科技研究中心」

TIRI was officially renamed the Taiwan Instrument Research Institute, National Applied Research Laboratories

儀科中心 (TIRI) 成立 45 週年之際，全銜更名為「台灣儀器科技研究中心」，彰顯其為國家級科研單位，有助於推動國家任務，提升國際能見度與影響力。未來持續以驅動先進儀器設備國產化為使命，展現符合時代特性的功能與價值。

On the occasion of the 45th anniversary, TIRI changed its name to the Taiwan Instrument Research Institute, National Applied Research Laboratories, facilitating its promotion of national tasks as a national scientific research institution, in order to improve its international visibility and influence. In the future, it will continue the mission of driving the localization of advanced instruments and facilities, and show the functions and values in line with the era characteristics.

「台灣儀器科技研究中心」持續推動先進儀器設備國產化，建構台灣產業儀器設備自主化的能量與契機。
TIRI continues to promote the localization of advanced instruments and facilities and to establish the capability and opportunity for the independence of Taiwan's industrial instruments and facilities.

2019/03/04

科技部智慧機械專案技術成果於「第 27 屆台北國際工具機展」(TIMTOS 2019) 盛大展出

The achievements of the smart machinery programs of the Ministry of Science and Technology were exhibited in "The 27th Taipei Int'l Machine Tool Show" (TIMTOS 2019)

儀科中心承辦「科技部智慧機械創新協作館」，於 3 月 4 日至 3 月 9 日「第 27 屆台北國際工具機展 (TIMTOS 2019)」盛大展出，其中「國研院智慧機械專案」技術成果為三大主題館之一，提供讓製造業達成自動化與智慧化所需的物聯網感測裝置、雲端、大資料分析、行動通訊等應用技術，以及傳統製造連貫製程與異質系統整合之情境示範，可做為學界智能化模組技術研發成果導入業界前的驗證測試場域。

Undertaken by TIRI, the "MOST Smart Machinery Innovation & Collaboration Pavilion" was exhibited in "The 27th Taipei Int'l Machine Tool Show (TIMTOS 2019)" from March 4 to March 9. The show for the achievements of "NARLabs smart machinery programs" was one of the three major theme pavilions to provide the application technologies needed to realize the automation and intelligence of the manufacturing industry, such as IoT sensing devices, cloud, big data analysis, and mobile communication. Coherent processes in traditional manufacturing are integrated with heterogeneous systems for verification and testing site before the research and development results of intelligent module technology are introduced into the industry.
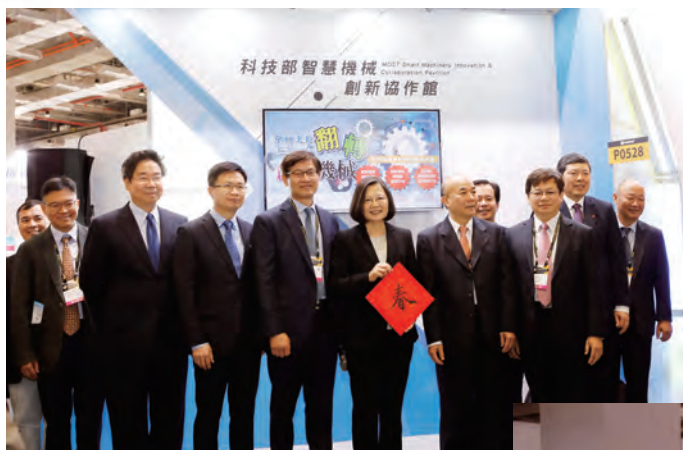
左圖：蔡英文總統（圖中）蒞臨「科技部智慧機械創新協作館」視察；右圖：科技部許有進次長蒞臨視察國研院智慧機械專案技術成果。

Left: President Ing-wen Tsai (center) visited "MOST Smart Machinery Innovation & Collaboration Pavilion".
Right: Yu-Chin Hsu (Deputy Minister of the Ministry of Science and Technology) visited the technical achievements of NARLabs smart machinery programs.
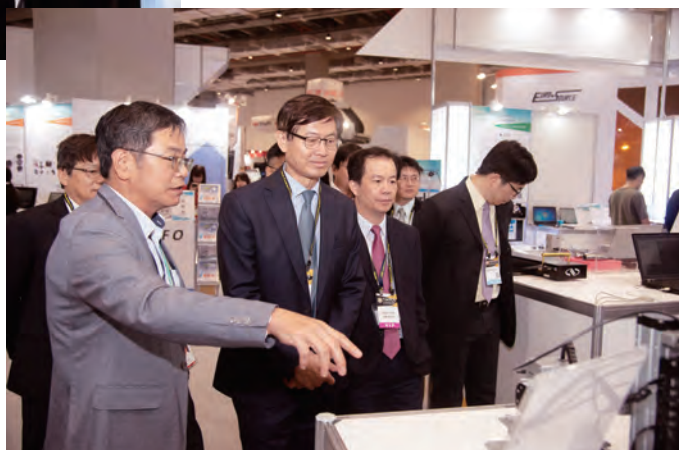
2019/03/16

學生創客齊聚「國研盃智慧機械競賽」
Student makers joined together for NARLabs Smart Machinery Competition

儀科中心協同美國機械工程師學會 (ASME) 台灣分會舉辦「2019 國研盃智慧機械競賽」學生競賽 (SPDC)，學生創客齊聚機械擂台，打造倉儲搬運機器人。

TIRI worked with ASME Taiwan to organize 2019 NARLabs Smart Machinery Competition (ASME Taiwan Student Professional Design Competition (SPDC)). Student makers all gathered to participate in the "Student Design Competition" and "Old Guard Oral Presentation Competition". The topic of "Student Design Competition" was "The Pick-and-Place Race".

「**2019** 國研盃智慧機械競賽」競技實況
"The Pick-and-Place Race" in 2019 NARLabs Smart Machinery Competition

2019/04/09

發表世界首創「晶圓級氣體感測器高效能點測系統」，為台灣邁向智慧環境 AIoT 時代之利器。

TIRI announced the world's first "High-throughput Wafer-level Probing System for Micro Gas Sensors", the innovative driver of AIoT intelligent environment

　　此系統於晶圓階段即可測試多顆氣體感測器（感測晶片）效能，不但大幅縮短檢測時間，且可提早於封裝前即查知每顆晶片的品質與分級，減少封裝資源浪費；另外亦可回饋測試結果，據以改善製程，提高生產效能與品質。

　　This system can test the performance of multiple gas sensors (sensing chips) in the wafer stage, which can greatly shorten the testing time and check the quality and classification of all chips before packaging to save packaging resource. In addition, testing results can further provide feedback to the front end process, improving production efficiency and quality.
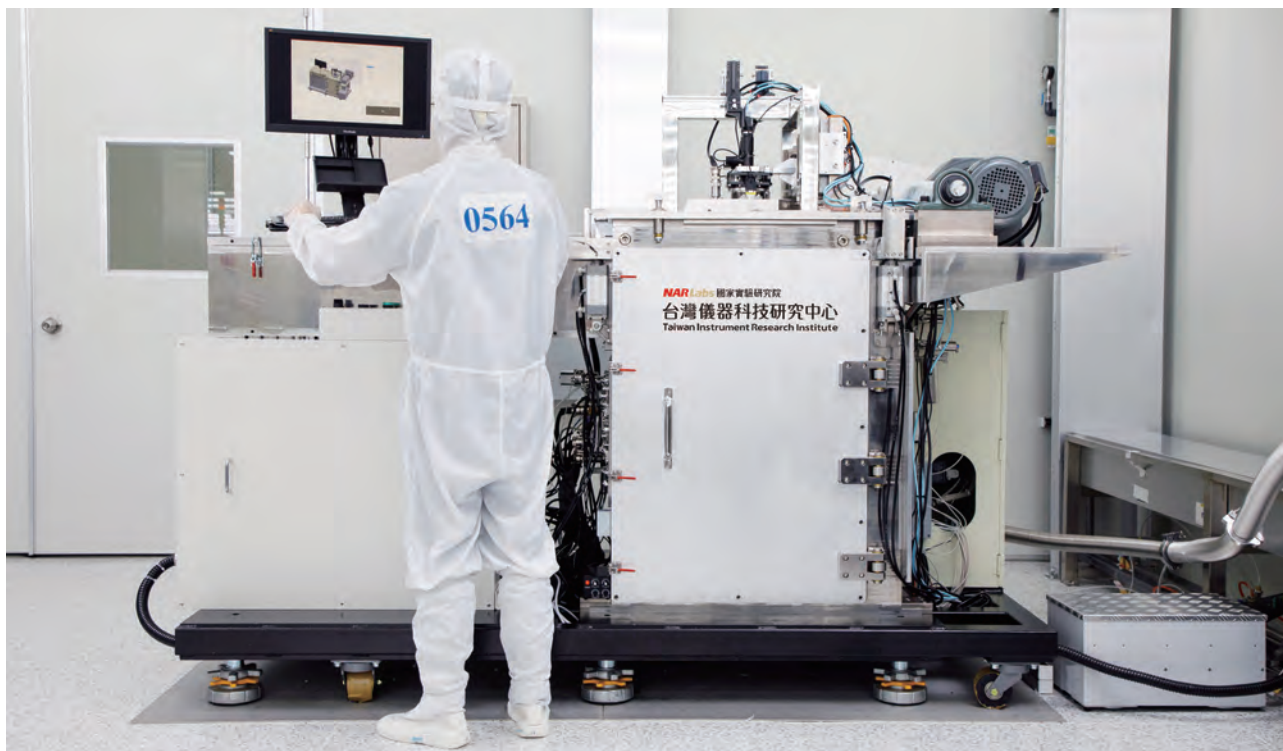
儀科中心世界首創「晶圓級氣體感測器高效能點測系統」

The world's first "High-throughput Wafer-level Probing System for Micro Gas Sensors" developed by TIRI

2019/06/17

儀科中心輔導台灣微創開發椎體撐開器由中醫大新竹附醫率先採用，全國首例國產品椎體重建手術成功！

Taiwan-made vertebral body augmentation system developed by Wiltrom under TIRI's guidance was first used in vertebral body reconstruction surgery performed successfully by the China Medical University Hsinchu Hospital

　　儀科中心為「國研醫材創價聯盟」主要執行者，成功輔導台灣微創股份有限公司開發出高技術含量的「椎體撐開器」，成為國內首家自主研發「椎體撐開器」通過台灣 TFDA 許可上市的醫療器材製造商，能與國外廠牌競逐國際市場。中國醫藥大學新竹附設醫院率先採用，領先全台完成第一例國產品椎體重建手術治療。

As the major executive of the NARLabs Medical Device Alliance, TIRI successfully assisted Wiltrom Co., Ltd. in developing the high-tech "vertebral body augmentation system", and becoming Taiwan's first vertebral body augmentation system manufacturer approved to be listed by TFDA to compete with foreign manufacturers in the international market. China Medical University Hsinchu Hospital took the lead in adopting the first Taiwan-made vertebral augmentation system for vertebral reconstruction surgery.

全國首例國產品椎體重建手術成功記者會
Press conference on the success of the first Taiwan-made vertebral augmentation system used in vertebral reconstruction surgery

2019/07/25

儀科中心攜手新創公司，卵巢癌早期篩檢技術大突破。

TIRI worked with a startup to make a great breakthrough in early-stage ovarian cancer screening

醫華生技公司與儀科中心及久元電子公司合作，開發出可快速篩查卵巢癌細胞的生醫檢測平台，兩年內已經在臺安醫院與彰化基督教醫院共完成超過 600 例的癌症細胞樣本數先期分析。由於成效顯著，醫華生技公司已獲得開發新藥與細胞治療技術的麗寶生醫公司 3 年 20 億元採購訂單，搶攻全球精準醫療商機。

In cooperation with TIRI and YTEC, CytoAurora Biotechnologies has developed a biomedical testing platform, which can rapidly screen ovarian carcinoma cells. In the past two years, the preliminary analyses of more than 600 cancer cell samples have been conducted in Taiwan Adventist Hospital and Changhua Christian Hospital. Due to its remarkable achievements, CytoAurora has obtained a three-year purchase contract of NTD 2 billion from Lihpao Life Science, which develops new drugs and cell therapy technologies, to seize the global business opportunity of precision medicine.

左起交通大學張懋中校長、科技部謝達斌次長、醫華生技黃忠諤董事長、麗寶生醫吳泓泰總經理、國研院王永和院長、國研院儀科中心楊燿州主任、久元電子陳桂標總經理共同見證醫華生技與麗寶生醫簽訂 20 億元採購合約。
From left: President Mau-Chung Frank Chang of National Chiao Tung University, Deputy Minister Dar-Bin Shieh of Science and Technology, CEO Chung-Er Huang of CytoAurora, General Manager Hong-tai Wu of Lihpao Life Science, President Yeong-Her Wang of NARLabs, Director Yao-Joe Yang of TIRI, and General Manager Gui-Biao Chen of YTEC witness of the signing of the NTD 2 billion purchase construct of CytoAurora and Lihpao Life Science.

2019/08/13

儀科中心與臺北科大共同建置核心實驗室提升研究能量

TIRI and National Taipei University of Technology jointly establish a core laboratory to enhance research ability

　　國研院儀科中心可提供前瞻研究儀器合作開發服務的研究機構，也已協助建立多個通過全國認證基金會 (TAF) 認可符合 ISO/IEC 17025 之標準實驗室，並提供相關檢校與測試服務；而臺北科大除延攬校內一流師資進駐外，更整合跨學院、跨領域、跨產業資源，雙方結盟，將攜手建置一個高規格核心設施實驗室，並為彼此的研究能量帶來更多助益，進而帶動產業發展。

　As a research institution providing the cooperative development services of prospective research instruments, TIRI has assisted in establishing many standard laboratories meeting ISO/IEC 17025 standards accredited by the Taiwan Accreditation Foundation (TAF), and offered calibration and testing services. In addition to recruiting first-class teachers, the National Taipei University of Technology integrated intercollege, interdisciplinary, and cross-industrial resources. Both sides will work together to establish a high standard core facility laboratory, and boost each other's research energy, in order to promote industrial development.

臺北科技大學聯手國家實驗研究院，加強雙方研究資源共享共創雙贏局面。
National Taipei University of Technology worked with NARLabs to share research resources and to create a win-win for both.

2019/08/21

學研與產業接地氣，開創台灣感測器自主在地化研發聚落，「科技部智慧機械創新館」聯合成果展示。

"Intelligent Machinery Innovation Pavilion of Ministry of Science and Technology (MOST)" was jointly shown the achievements to bridge the academia and industry in order to create self-developed and localized sensor R&D clusters in Taiwan

　　「科技部智慧機械創新館」由儀科中心承辦，8 月 21 日至 24 日於「台灣機器人與智慧自動化展 (TAIROS)」盛大展出，同步舉辦「智慧機械感測器」與「AQI 氣體感測器」場域測試驗證合作啟動儀式，由國家實驗研究院分別與兩大專案計畫終端應用與場域整合測試廠商「東台精機股份有限公司」及「巨晶實業有限公司」簽署合作備忘錄，共同打造「智慧機械感測器與 AQI 氣體感測器服務平台」，期能開創台灣感測器聚落，落實自主研發與場域測試應用發展契機。

　Undertaken by TIRI, "Intelligent Machinery Innovation Pavilion of Ministry of Science and Technology (MOST)" was exhibited in the "Taiwan Automation Intelligence and Robot Show (TAIROS)" from August 21

to 24. The signing ceremony for the new partnership in the verification and testing sites for smart machinery sensors and Air Quality Index (AQI) gas sensors was held at the same time. NARLabs signed memorandum of cooperation with "Tongtai Machine & Tool" and "Macro Technology Instruments" respectively, which are the terminal application and site testing integration manufacturers. The three parties jointly established the "smart machinery sensor and AQI gas sensor service platform", which expects to develop sensor clusters in Taiwan and create opportunities for R&D and testing site applications.

左圖：陳建仁副總統蒞臨科技部智慧機械創新館視察（右四）；右圖：科技部智慧機械創新館」於「2019 台灣機器人與智慧自動化展」盛大展出。

Left: Vice President Chien-Jen Chen visited Intelligent Machinery Innovation Pavilion of Ministry of Science and Technology (MOST) for inspection (fourth right).

Right: Intelligent Machinery Innovation Pavilion of Ministry of Science and Technology (MOST)" was exhibited in "2019 Taiwan Automation Intelligence and Robot Show".

2019/08/23

儀科中心跨國攜手日本 Edgecross 聯盟簽署合作備忘錄，參與國際智機標準化。

TIRI and Edgecross consortium of Japan signed a MOU for cooperation to participate in international smart machinery standardization

促進雙方於「邊緣計算」領域的發展合作，推動智慧製造場域設備與雲端資料蒐集介面之標準化、擴充雲端計算能力，提升國內機聯網研發能量，進而藉此國際合作將智慧製造技術推向新的里程碑。

Promoting development and cooperation between both sides in "edge computing", drive the standardization of the interface between the smart manufacturing equipment and the cloud data collection, expand cloud computing power, and enhance the network research and development capability of Taiwan, in order to push smart manufacturing technology to a new milestone through international cooperation.

國研院儀科中心楊燿州主任（右）與日本 Edgecross 聯盟事務局德永雅樹局長（左）代表簽署合作備忘錄。

Director Yao-Joe Yang (right) of TIRI and Director General Tokunaga Masaki (left) of Edgecross Consortium signed the MOU

2019/09/11

台灣儀器科技研究中心 45 週年暨更名慶祝大會
TIRI's 45th anniversary and renaming celebration

科技部謝達斌次長（前排左三）國研院王永和院長（前排左四）蒞臨祝賀
Deputy Minister Dar-Bin Shieh of Science and Technology (third left of the front row) and President Yeong-Her Wang of NARLabs (fourth left of the front row) visiting.

儀科中心將以驅動先進儀器設備國產化為使命，全力投入關鍵光學、真空、智慧製造等儀器設備自製開發，應用於半導體、生醫、光電、太空等產業或學術領域，帶動儀器設備上下游關鍵零組件在地化發展，建構台灣產業儀器設備自主化的能量與契機。科技部謝達斌次長肯定儀科中心多年來對台灣科技發展的貢獻，並且能在每次變革中持續發揮影響力，展現符合時代特性的功能與價值。

With the mission to drive the localization of advanced instruments and facilities, TIRI will spare no effort to develop key optical, vacuum, and intelligent manufacturing instruments and facilities, which can be applied in industrial and academic fields, such as semiconductor, biomedicine, optoelectronics, and aerospace, promote the localization development of the upstream and downstream critical parts and components of instruments and facilities, and establish the independent R&D capability and opportunity of instruments and facilities in Taiwan. Dar-Bin Shieh, the deputy minister of the Ministry of Science and Technology, affirmed TIRI's contribution to the development of science and technology in Taiwan over the years, and stated that TIRI could continue to have influences on all changes and show the functions and values in line with the era characteristics.

台灣儀器科技研究中心 45 週年暨更名慶祝大會全體大合照。
Group photo for the 45th Anniversary and Renaming Ceremony of TIRI

2019/09/19

2019 台灣國際半導體展，儀科中心展現自研自製成果。

TIRI showed the self-development and self-production achievements in 2019 SEMICON Taiwan

儀科中心以驅動儀器設備在地化為使命，近年來全力投入半導體高階儀器設備及關鍵零組件之自研自製，展示多樣態曝光機客製化光學元件展品，落實半導體設備光學元件自主化製造目標，更研發出國內第一部自製先進半導體原子層蝕刻 (Atomic Layer Etching, ALE) 設備，同步於技術論壇發表「國研院先進半導體設備與製程技術」在地化相關研發成果。

With the mission to drive the localization of instruments and facilities, in recent years, TIRI has strived to develop and produce advanced semiconductor instruments and facilities, as well as key parts and components, demonstrated the diverse customized optical components of exposure equipment, implemented the objective to independently manufacture the optical components of semiconductor devices, researched and developed Taiwan's first self-developed advanced semiconductor atomic layer etching (ALE) equipment, and published the research and development achievements of localizing "NARLabs' advanced semiconductor equipment and process technology" in the technical forum.

左圖：於「**2019 台灣國際半導體展**」展示通過半導體製程實際驗證之曝光機關鍵零組件，以及半導體產業高階儀器設備自主研發成果與客製服務績效；右圖：「國研院先進半導體設備與製程技術」技術論壇。

Left: at "SEMICON Taiwan 2019", TIRI showed the critical parts and components of exposure equipment and the self-developed research achievements of advanced instruments and facilities in the semiconductor industry and the performance of customized services.

Right: The technical forum of "NARLabs advanced semiconductor devices and process technology".

2019/10/06

第十一屆「國研盃 *i*-ONE 儀器科技創新獎」，產學研攜手推動儀器創新實作之人才培育紮根

The 11th "NARLabs Instrument Technology Innovation Competition, *i*-ONE", the talent cultivation of instrument innovations and practices was promoted through industry-academia cooperation

　　「國研盃 *i*-ONE 儀器科技創新獎」創設迄今已逾十載，培育科研人才不遺餘力，歷年來共計 273 組優秀作品報名參賽，成果受到科技部長陳良基於個人臉書平台上關注與讚賞。

　To date, "NARLabs Instrument Technology Innovation Competition, *i*-ONE" has been founded for over 10 years and has devoted to training scientific talents. Over the years, a total of 273 excellent works have applied for the competition, and the achievements were concerned about and appreciated by Liang-Gee Chen, the minister of the Ministry of Science and Technology, in his personal Facebook account.

第十一屆國研盃 *i*-ONE 儀器科技創新獎，新世代的創客生力軍。
The 11th NARLabs Instrument Technology Innovation Competition, *i*-ONE, gathered together the makers of a new generation.

2019/11/07

儀科中心與長庚大學合作開發輔導「癌症檢測試劑開發及商品化」，勇奪科技部法人鏈結產學合作成果績優案源獎第一名。

"Cancer detection reagent development and commercialization", as developed and guided by TIRI in cooperation with CGU, won the outstanding case award champion in Industry-Academia Catalyst E-Platform (I-ACE) Show held by the Ministry of Science and Technology

　　儀科中心與長庚大學合作開發輔導「癌症檢測試劑開發及商品化」，利用免疫分析法定量唾液樣品中新腫瘤生物標記 OCBM 1 含量，做為篩檢口腔癌的指標。其產品優勢為非侵入性採集，收集方式簡單、易操作、病人接受度高，目前已完成雛形品開發並進入 GMP 量產階段，正著手國內外臨床試驗與上市許可申請，預計於 2020 年後陸續上市。

　TIRI developed and guided "cancer detection reagent development and commercialization" in cooperation with Chang Gung University, and quantified the contents of the new tumor biomarker "OCBM 1" in sputum samples by using immunoassay, to be an index to screen oral cancer. Its advantages are non-invasive

collection, easy collection method, simple operation, and high patient acceptance. At present, the prototype has been developed and the products have been in the high-volume manufacturing of GMP. Clinical trials are being conducted at home and abroad, and the marketing license is being applied. The products are expected to be marketed in succession after 2020.

儀科中心輔導團隊獲頒績優案源獎第一名
TIRI winning the outstanding case award champion of MOST I-ACE Show

2019/11/15

「航太等級遙測酬載光學元件與系統研發團隊」榮獲「中華民國科技管理學會第 21 屆科技管理獎」

"Team of Optics Development for Space Missions and Industry" won "the technological management award of the 21st session by the Chinese Society for Management of Technology"

　　「福衛五號衛星遙測酬載之光學元件與光學次系統」建立在儀科中心 45 年以上的光學加工技術上，在團隊的努力下，一步一腳印，突破大口徑非球面鏡的技術瓶頸，完成「自製航太鏡片」，為台灣航太史寫下新一頁的里程碑。大口徑光學元件與系統核心技術亦導入半導體製造廠與半導體設備供應鏈等，往其他更多的加值應用發展，持續推動臺灣儀器產業商機及自主化發展。

"The optical components and optical sub assembly of the Formosat-5 satellite remote sensing instrument" is based on more than 45 years' of the optical manufacturing technology of TIRI. With the efforts of the team, the bottleneck of meter-scale aspheric optics fabrication technology has been broken through step by step, and optics for space missions have been created, marking a new milestone for Taiwan's aerospace history. The key technologies of meter-scale aspheric optical components and optical systems have been introduced into the semiconductor industry in the direction of more value-added applications to promote business opportunities and domestic developments of Taiwan's instrument industry continuously.

左圖：「航太等級遙測酬載光學元件與系統研發團隊」榮獲肯定；右圖：陳峰志副主任代表中心出席領獎（右一）。
Left: "Team of Optics Development for Space Missions and Industry" won the affirmation.
Right: Deputy Director General Dr. Fong-Zhi Chen accepted the prize on behalf of TIRI (first right).

「光學系統整合研發聯盟 2019 交流研討會」跨領域專家學者齊聚交流，促成產學研合作機會。

"2019 Joint Seminar of Optical Systems Integration R&D Consortium" brought together interdisciplinary experts and scholars to promote the opportunity of industry-academia cooperation

儀科中心「光學系統整合研發聯盟」舉辦「光學系統整合研發聯盟 2019 交流研討會」暨「國研院儀科中心技術服務推廣説明會」，自 2013 年成立交流平台以來，促成多件產學研三方合作之研究成果。來自北中南各大專院校的教授，以及涵蓋精密光學製造、真空鍍膜、生醫新創與半導體設備等廠商齊聚一堂深入交流，藉由不同領域主題討論激發與會者發想相關技術應用，同時促進不同領域的專家交流，建立更多合作機會。

The TIRI "Optical Systems Integration R&D Consortium" held the "2019 Joint Seminar of Optical Systems Integration R&D Consortium" and "Technical Service Promotion Seminar of Taiwan Instrument Research Institute, NARLabs". Since its establishment in 2013, the exchange platform has contributed to the research results of many industry-academia cooperation cases. Through various topical discussions, it made the participants think about the applications of related technologies, and promoted the exchange of experts in different fields to create more opportunities for cooperation.

來自北中南各大專院校的教授，以及涵蓋精密光學製造、真空鍍膜、生醫新創與半導體設備等廠商齊聚一堂深入交流。
The professors from all universities and the manufacturers in precision optical instrument manufacturing, vacuum coating, biomedical innovation and semiconductor equipment gathered for in-depth exchanges.

2019 年獲獎記錄

活動 Event	參賽作品 Participating Work	獲獎項目 Award
中華民國計量工程學會 Chinese Metrology Society	與晶元光電合作開發之「晶圓級氣體感測器高效能點測系統」 "High-throughput Wafer level Probing System for Micro Gas Sensors" developed in cooperation with Epistar	第 15 屆計量科技研發創意獎 Innovation award for metrology technology research and development of the 15th session
2019 台灣創新技術博覽會 2019 Taiwan Innotech Expo	與晶元光電合作開發之「晶圓級氣體感測器高效能點測系統」 "High-throughput Wafer level Probing System for Micro Gas Sensors" developed in cooperation with Epistar	入選技術獎 Shortlisted for a technology award
中華民國科技管理學會 Chinese Society for Management of Technology	航太等級遙測酬載光學元件與系統研發團隊 Team of Optics Development for Space Missions and Industry	第 21 屆科技管理獎一學研團隊類 Technological management award of the 21st session - academia team
108 年度「產學合作計畫成果發表暨績效考評會」 2019 Achievement Publication and Performance Appraisal Meeting of "Industry-Academy Collaborative Research Projects"	曝光機用高均勻度紫外光之陣列式二極體光源開發 Development of exposure machines by using high uniformity UV-LED array light sources	產學成果簡報優良獎 Industry-academy collaborative achievements outstanding brief award
108 年度「產學合作計畫成果發表暨績效考評會」 2019 Achievement Publication and Performance Appraisal Meeting of "Industry-Academy Collaborative Research Projects"	折繞射複合式紅外波段脈衝雷射加工光學系統開發 Development of infrared pulsed laser machining optical system combining refraction and diffraction	產學成果海報展示特優獎 Special award for the poster presentation of industry academy collaborative achievements
科技部 108 年法人鏈結產學合作成果發表會 2019 Industry-Academia Catalyst E-Platform (I-ACE) Show of the Ministry of Science and Technology	癌症檢測試劑開發及商品化 Cancer detection reagent development and commercialization	輔導績優案源第一名及最佳人氣銀牌獎 First prize for guide of outstanding case award and silver medal for best popularity
台灣顯微鏡學會 108 年度會議暨第 39 屆學術研討會最佳顯微影像競賽獎 The Best Microscopic Image Award of 2019 Annual Conference and 39th Seminar by Microscopy Society of Taiwan	單斜角晶系之晶體結構分析 Crystal structure analysis of monoclinic crystal system	最佳顯微影像競賽獎第一、二名與最佳海報論文獎一、二、三名。 First and second prizes for best microscopic image, and first, second, and third prizes for best poster paper

Taiwan Instrument Research Institute

TAIWAN INSTRUMENT
TIRI est. 1968

儀器科技發展

Development of Instrument Technology

臺灣第一台自研自製 12 吋原子層蝕刻系統
12-inch Atomic Layer Etching System

　　儀科中心開發具原子級製程控制能力的蝕刻系統，將原子層蝕刻製程運用在先進材料上，已成功應用於 5 nm Gate-All-Around MOSFETs 元件選擇性蝕刻製程，提升儀器設備自製及製程研發技術層次。未來將引領產學各界克服邏輯元件微縮至 10 奈米以下之重要挑戰。

　The atomic layer etching system, as developed by TIRI, has the ability to control atomic processes, and uses the atomic layer etching process for advanced materials. It has been successfully applied to the selective etching process of 5 nm Gate-All-Around MOSFETs components, thus, improving the technical level of instruments and equipment self-fabrication, as well as process research and development. In the future, it will lead industrial and academic circles to overcome the critical challenge of miniaturizing logic components to less than 10 nm.

系統規格 System specifications：
- 12 inch 晶圓製程 12 inch wafer process
- ICP 脈衝電漿 ICP pulse plasma：13.56 MHz、3 kW、1 kHz 啟動頻率 start frequency
- Platen 電極 Platen electrode：13.56 MHz、0.1 － 300 W
- 高頻製程氣體切換 High-frequency process gas switching

可調控製程模組之六吋叢集式 ALD/Thermal ALE 設備
6-inch ALD/Thermal ALE Cluster System

　　儀科中心所開發的此系統可於原子層沉積或蝕刻製程模組間切換，大幅降低膜層間的大氣雜質汙染，提供元件優異的介面性質。Thermal ALE 模組首創以升降方式調控製程溫度，低溫時特殊氣體吸附於表面，高溫時脫附達到蝕刻效果。目前應用於半導體業界最前沿製程元件測試，如 Gate-All-Around (GAA) 3D 部分。

　The system developed by TIRI can be used to switch atomic layer depositions or etching process modules, which significantly reduces air contamination between films and provides excellent interfaces for components. The thermal ALE module is the first to regulate the process temperature by lifting. A special gas is adsorbed on the surface at low temperature and desorbed to achieve etching at high temperature. Currently, it is applied to process component testing, which is the forefront of the semiconductor industry, such as Gate-All-Around (GAA) 3D.

系統規格 System specifications：
- 樣品尺寸 Sample size：6 inch
- 樣品厚度 Sample thickness< 1 cm
- 材料 Material：HfO_2, Al_2O_3, AlN

桌上型 1 吋試片原子層蝕刻系統
Desktop ALE System

　　儀科中心所開發的原子等級蝕刻製程系統，廣泛應用於蝕刻製程相關研究與新材料的開發，桌上型系統不占空間、製程腔體流場分佈均勻且規劃製程安全防護，節省研發期間前驅物材料的浪費。

　　The atomic etching process system developed by TIRI is widely used for etching process-related research and new material development. The desktop system is space-efficient, the process cavity flow field is evenly distributed, and process safety protection is planned, thus, saving precursor materials during research and development.

系統規格 System specifications :

◆ 加熱載座模組化，具備不同製程溫度條件選擇模組。
　Modular heating carriers with optional modules for various temperature conditions.
◆ 管理製程真空閥門啟閉速度 5 ms 速度
　The operational speed of the vacuum valve is 5 ms for process control.
◆ 系統以 SEMI S2 規範設計
　System designed according to SEMI S2 specifications.
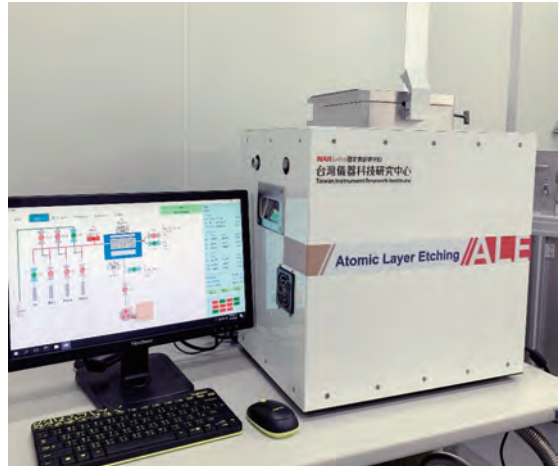
自動化光罩 / 晶圓智慧傳遞人機系統
Intelligent Mask/Wafer Transfer System

　　此自動化傳遞系統特點為儀科中心結合機械視覺對位，透過影像辨識演算法，在每次取放光罩時再一次定位，抑制對位誤差的累進，可應用於半導體曝光製程中所用到之晶圓傳遞系統，將對位精度誤差降低至 100 μm 以下，避免光罩及晶圓取放失敗的狀況發生。
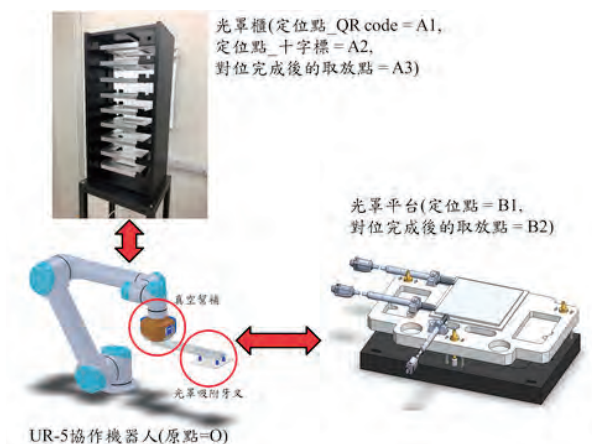
　　The feature of this automatic transfer system is re-positioning each time by an image recognition algorithm in combination with mechanical visual alignment to suppress the progression of alignment errors while the mask is removed or placed. It can be applied to the wafer transfer system used in the semiconductor exposure process to reduce the alignment accuracy error to less than 100 μm and avoid the failure of mask and wafer placement.

系統規格 System specifications :

◆ 光罩傳遞位置校準精度 Calibration accuracy of mask transfer position < 0.1 mm
◆ 晶圓傳遞重複精度 Repeatability error of wafer transfer：±0.02 mm
◆ 可多點定位座標設定，移動路徑規劃。
　Coordinate setting and action path planning for multi-point positioning

世界首創晶圓級氣體感測器高效能點測系統
High-throughput Wafer-level Probing System for Micro Gas Sensors

儀科中心首創整合真空腔氣體供應系統、自動光學對位及電性點測設備，此系統於晶圓階段即可測試氣體感測器（感測晶片）效能，且同時測試多顆，不但大幅縮短檢測時間，並提早於封裝前即查知每顆晶片的品質與分級，減少封裝資源浪費；另外亦能回饋測試結果，據以改善製程，提高生產效能與品質。

TIRI was first to integrate a vacuum chamber gas supply system, automatic optical alignment, and electrical probing equipment. This system can test the performance of multiple gas sensors (sensing chips) in the wafer stage at the same time, which greatly shortens the testing time, and checks the quality and classification of all chips before packaging to save packaging resources. In addition, it can return test results, in order to improve the process and enhance production efficiency and quality.
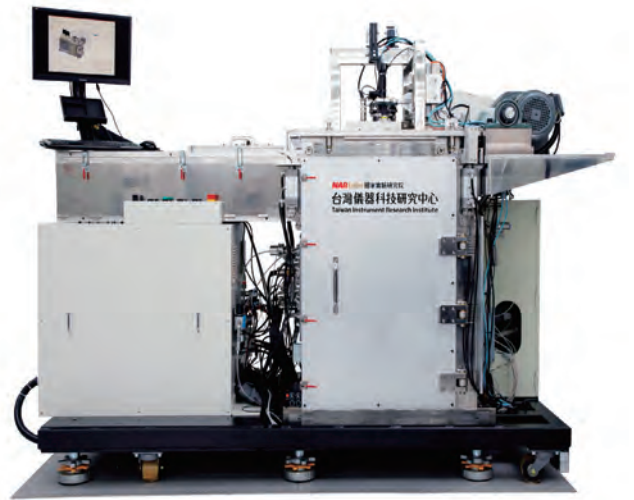
系統規格 System specifications :

◆ 自動光學對位 Automatic optical alignment：5 μm/pixel
◆ 晶圓加熱溫度 Wafer heating temperature：~ 200 ℃
◆ 線陣列探針卡 Line array probe card：10 die/probing
◆ 量測氣體 Measuring gas：H_2、H_2S、NH_3、C_2H_5OH、CO

智慧機械應用　Applications in smart machinery

線上即時回饋 CIGS 太陽能板自動光學檢測設備
In-line Optical Inspection Equipment for CIGS Solar Panels

儀科中心為台灣的 CIGS 太陽能板廠商客製開發線上板材全檢設備，改善傳統人工抽檢耗時、局部檢測等缺點，提高製造效能及良率；並可藉由板材檢測結果來研判生產設備之參數變異，以期儘早發現問題，進行設備改善（如更換刀具）或調整製程等。

TIRI developed the customized automatic in-line panel inspection equipment for Taiwan's CIGS solar panel manufacturers, in order to correct the shortcomings of time consumption and partial inspection in traditional manual sampling, and improve manufacturing efficiency and yield. Moreover, the parameter changes of production equipment can be analyzed based on the panel material inspection results, which expects to identify problems early for equipment improvement (such as cutter replacement) and process adjustment.
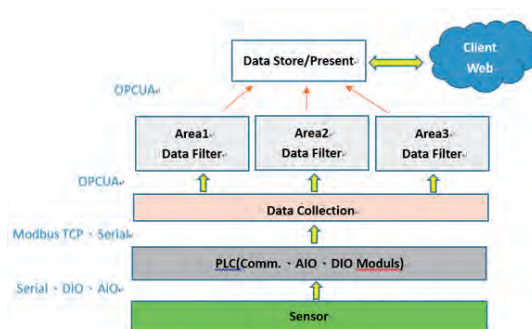
系統規格 System specifications：

◆ 量測與檢測板材尺寸 Panel size for measurement and test：1220 mm × 620 mm

◆ 光學解析度 Optical resolution：5 μm/pixel

◆ 檢測效能 Detection efficiency ＜ 60 秒（含板材進出料與定位時間）

◆ 板材檢測項目 Items of inspection：

　(1) 鍍膜帶寬 coating width

　(2) 切割之線寬 cutting line width

　(3) 直線度及間距 spacing & straightness

　(4) 污染微粒 pollution particles

　(5) 邊緣崩缺 collapse of film edge

智慧廠房監控系統
Smart Factory Monitoring System

　　儀科中心提供適用於製造業的智慧廠房監控系統解決方案，以物聯網概念蒐集機台設備及環境設施數據如溫濕度、電力消耗等，經大數據處理運用後，提升設備運轉效能、減低機台失效風險、延長機台壽命，達到節省成本目標。透過監控軟體以美觀、直覺化的圖表呈現於攜帶裝置例如手機、平板等，「秀才不出門，能知天下事」，是智慧廠房監控系統最佳詮釋。

　TIRI provides a solution for smart factory monitoring systems, which is applicable to manufacturing, in order to collect the data of machines, equipment, and environmental facilities, such as temperature, humidity, and power consumption, as based on the concept of IoT. After big data processing and application, it can improve the efficiency of equipment operation, reduce the risk of machine failures, and extend machine life, aiming to achieve the goal of cost-saving. Neat and intuitive-based graphs can be shown by the monitoring app on portable devices, such as mobile phones and tablets. "A scholar knows all the world's affairs without going outdoors" is the best interpretation of the smart factory monitoring system.

系統規格 System specifications：

◆ 設備數據即時顯示與圖形化呈現

　Real-time display and graphical presentation of device data

◆ 歷史數據區間查詢與報表匯出

　Historical data interval query and report exporting

◆ 各廠域即時連線狀態確認與異常警報

　Real-time on-line state confirmation and abnormal alarm of all factory areas

◆ 廠域分區權限管理

　Factory division authority management

◆ 遠端 Web 顯示

　Remote Web display

次鏡組車削定心機之溫升熱補償 AI 系統
Thermal Deformation Monitoring AI System in Sub Cell Alignment Turning System

鏡片車削過程易因轉台溫升變形而產生加工誤差，本系統於儀科中心所設計開發的次鏡組車削定心機上架設溫度計以及電容式位移計，根據液靜壓轉台不同轉速條件下進行數據量測，並根據機台特性及加工需求建構出一人工智慧演算法辨識模型。本系統擁有良好之熱變位預測性能，可有效補償車削定心機於加工時轉台溫升造成的變形現象。

Machining errors are likely to be produced during the lens turning process due to the deformation caused by the temperature rise of the turntable. The sub cell alignment turning system, as designed and developed by TIRI, is equipped with a thermometer and a capacitive displacement sensor, in order to measure data at different speeds of the hydrostatic pressure turntable and to establish a model to identify artificial intelligence algorithms according to the machine features and machining needs. With good performance in predicting thermal displacement, this system can effectively compensate the deformation caused by the temperature rise of the turntable during the machining of the alignment turning system.

系統規格 System specifications :

◆ 系統軟韌體介面 Software and firmware interface of the system：NI DAQ module、Python 3.6.8、Tensorflow 1.13.1、Keras 2.2.4
◆ 熱變位預測指標均方差 Mean square error (MSE) of thermal displacement prediction index：0.000159
◆ R^2 決定係數 the betermination coefficient of R^2 (R^2-score) ： 0.9970

醫療及災防產業應用　Applications in medical and disaster prevention industries

可應用於病理分析之生醫顯微影像光譜檢測系統
Biomedical Microscope Image with the Hyperspectral Analysis System

儀科中心整合顯微取像與高光譜模組，並開發細胞病理影像人工智慧軟體，透過影像深度學習的方式分辨不同組織及細胞並獲得相關光譜資訊，可延伸應用於檢測攝護腺組織、子宮頸抹片、泌尿上皮細胞檢測等相關領域之病理分析平台。

TIRI integrated microscopic imaging with hyperspectral modules and developed the AI software for cytopathic imaging classification, which can distinguish different tissues and cells, and obtain
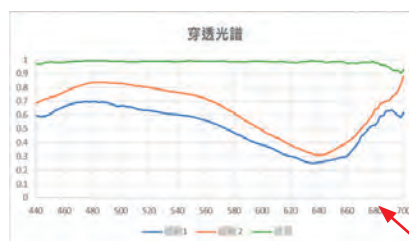
細胞組織光譜資訊
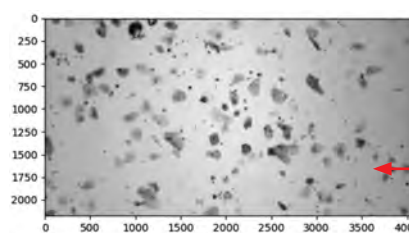
細胞組織顯微影像

生醫顯微影像光譜檢測系統

relevant spectral information through deep image learning. It can be widely applied to the cytopathic analysis platform to test prostate tissues, cervical smears, and urothelial cells.

系統規格 System specifications：

◆ 影像光譜檢測儀尺寸 Hyperspectral detector size (L×W×H)：28 cm × 24 cm × 55 cm

◆ 放大倍率 Amplification ratio：100

◆ 空間解析度 Spatial resolution：2 µm

◆ 光譜檢測範圍 Spectral detection range：400 nm － 1000 nm

◆ 光譜解析度 Spectral resolution：5 nm

可攜式遠距橋底裂縫量測儀
Remote Measurement Device for the Bridge Base Cracks

儀科中心所開發的橋底裂縫量測儀，可透過智慧行動裝置操控量測輔具之水平旋轉角及俯仰角，記錄四個雷射光點參考坐標及雷射測距，將這些角度與距離參數與相機所拍攝裂縫相片整合，搭配透過 WI-FI 伺服器或雲端完成裂縫寬度演算並回傳至使用者智慧行動裝置。

The measurement device for bridge base cracks, as developed by TIRI, can control the horizontal rotation angles and pitching angles of the auxiliary measurement tools through the intelligent mobile device, and record the reference coordinates of 4 laser spots and laser ranges. These angles and distance parameters are integrated with the crack photos taken by the camera to calculate the crack width through the WI-FI server or cloud, and sent the data back to the user's intelligent mobile device.

系統規格 System specifications：

◆ 水平旋轉角 Horizontal rotation angle：±30°

◆ 俯仰角度 Pitching angle： +90°~-60°

◆ 量測距離 Measurement distance ≦ 30 m

◆ 角度與距離參數與相片整合成 meta 格式
  The angle and distance parameters are integrated with the photos into a meta format

◆ 儀器重量 Instrument weigh < 20 kg

Taiwan
Instrument
Research
Institute

TAIWAN INSTRUMENT
TTRI est. 1968

任務導向研發

Mission-oriented
Research
& Development

推動前瞻基礎建設－「自研自製高階儀器設備與服務平台」計畫
Promotion of Forward-Looking Fundamental Construction - "Advanced Research Instrumentation Development Service Platform" Project

儀科中心以累積多年的光電儀器研製以及光機系統整合經驗，參與前瞻基礎建設計畫中的「自研自製高階儀器設備與服務平台」整合型計畫。主要建立我國半導體製程高階封裝儀器設備自製能力，逐步協助國內半導體設備產業進入高附加價值之半導體製程設備供應鏈，使國內廠商能佈局半導體製程設備產業，落實整合國內半導體設備上中下游之技術，並將國內半導體設備能力再升級，並提供國內自研自製半導體設備進廠前的機台測試與規格驗證。

2019 年主要成果如下：

◆ 小型步進式曝光機 (曝光解析度 L/S 5 μm) 與對準式曝光機 (曝光解析度 L/S 2 μm) 之系統組裝、測試與優化，整合投影鏡頭、光源系統、光罩 / 晶圓對位平台與整機結構等，此技術將導於設備產業，促使設備產業升級與完善。

◆ 成功開發完成適合高功率元件製程與低損耗及高效率電路，綠色高功率元件技術的原子層蝕刻設備，以自製 ALE 設備成功應用於 5 nm Gate-all-around MOSFETs 元件選擇性蝕刻製程，並將此技術導入打造 4 吋原子層蝕刻 / 沉積系統提供清華大學製作 TEM 試片保護層之關鍵設備。

◆ 建立六吋 Cluster ALD/Thermal ALE 製程平台，國際前驅物大廠 (如：美商 RASIRC 與法商 Air Liquid) 亦使用此平台以服務國內半導體廠進行先期研究，也間接促使台灣大學、交通大學、中山大學、台灣半導體中心與日本等學研機構共同使用 ALD 聯合實驗室之 Coupon ALD 系統。

自研自製原子層蝕刻技術為清華大學客製化打造 4 吋原子層蝕刻 / 沉積系統
Self-developed atomic layer etching technology introduced into customized 4-inch atomic layer etching/deposition system for National Tsing Hua University

TIRI has accumulated abundant experience in the research and development of optoelectronic instruments, and the integration of optomechanical systems. It has also participated in the integrated project of the "Advanced Research Instrumentation Development Service Platform" in the "Forward-Looking Fundamental Construction". This project primarily aims to self-develop high-end packaging equipment for semiconductor process technology in Taiwan, thus, gradually assisting Taiwan's semiconductor equipment industry to expand into the semiconductor process equipment supply chain, in order that Taiwanese manufacturers can deploy and level up the semiconductor process equipment industry. Also, TIRI hopes to help Taiwan's manufacturers configure and integrate the upstream, midstream, and downstream technologies of semiconductor equipment industry in Taiwan. Furthermore, it strives to upgrade Taiwan's semiconductor equipment capability, and provide equipment testing and verification to Taiwan's self-developed semiconductor equipment before the equipment enters the plant.

The main achievements of 2019 are as follows:

◆ Assembled, tested, and optimized the stepper (L/S:5μm) and mask aligner (L/S:2μm), and integrated the projection lens, light source systems, mask/wafer alignment platforms, and overall systems. This technology will be oriented towards the equipment industry, and promote the upgrading and improvement of the equipment industry.

◆ Successfully developed the atomic layer etching equipment suitable for the development of green high-power component technology such as high-power component manufacturing processes and low-loss & high-efficiency circuits. The self-developed ALE equipment has applied to the selective etching process of 5nm gate-all-around MOSFETs and also introduced its technology into the 4-inch atomic layer etching/ deposition systems as the key equipment for producing a protective layer for TEM test chips in National Tsing Hua University.

◆ Established the 6-inch Cluster ALD/Thermal ALE process platform. International leading precursor manufacturers (such as RASIRC in the US and Air Liquid in France) also performed preliminary research by adopting this platform to serve Taiwan's semiconductor foundries. Indirectly promoted the National Taiwan University, National Chiao Tung University, National Sun Yat-sen University, Taiwan Semiconductor Research Institute, and academic institutions in Japan to jointly use the Coupon ALD system of the ALD Joint Laboratory.

辦理「國研院先進半導體設備與製程技術」技術論壇，展示「自研自製高階儀器設備與服務平台」計畫成果。
The achievements of the "Advanced Research Instrumentation Development Service Platform" project were published in the technical forum of "NARLabs advanced semiconductor devices and process technology".

推動創價醫材加速器平台計畫
Promotion of Medical Device Accelerator for Value Creation Project

　　儀科中心運用自身生醫科技核心實驗室研發能量與檢測驗證能力，提供研發團隊醫療器材開發輔導與檢測驗證一站式服務。藉由創價醫材加速器平台，加速研發團隊研究成果之轉譯與加值，並橫向連結北、中、南三大科學園區與工業局，加速新創及協助既有生醫廠商升級茁壯，提升生醫產業國際競爭力。

2019 年主要成果如下：

◆ 建置完成全國獨一能提供高品質表面修飾膜層製作與檢測的服務平台，協助生醫晶片新創團隊突破表面修飾技術瓶頸，並擴展醫材開發服務能量至精準醫療領域。

◆ 建置「影像品質控制」標準化流程，確保實驗室造影設備 (MRI、CT、C-arm X 光機、超音波) 服務之影像品質符合標準，提升實驗室動物造影服務品質。與積層製造實驗連結，提供二維醫學影像重建及三維幾何外形輸出，擴大 3D 列印於醫材及骨材領域之應用。另考量植入式醫材輕量化與骨癒合兩項需求，完成鈦合金多孔性結構設計與製程驗證程序，可提供研發團隊多孔輕量化結構設計服務，加速國內客製化 3D 列印醫療產品發展。

◆ 2019 年本平台已輔導 2 廠商取得國際認證，包括鈦隼生物科技股份有限公司腦部手術導航系統取得 ISO 13485 國際認證、美萌科技股份有限公司高強度陶瓷矯正器通過美國 FDA 510(k) 上市許可，有效促成新創公司產品與國際市場接軌。另協助 3 團隊分別通過人體試驗審查委員會申請，進行人體試驗，加速研發成果進入臨床應用。

儀科中心與長庚大學合作開發輔導「癌症檢測試劑開發及商品化」，勇奪科技部法人鏈結產學合作成果績優案源獎第一名。

"Cancer detection reagent development and commercialization", as developed and guided by TIRI in cooperation with CGU, won the outstanding case award champion in Industry-Academia Catalyst E-Platform (I-ACE) Show held by the Ministry of Science and Technology.

Given its own research and development advantages of biomedical core facilities, as well as testing and verification capabilities, TIRI provides a one-stop service for medical device R&D teams from prototype counseling to product testing and verification. Based on the medical device accelerator platform, TIRI assisted the medical device R&D teams to accelerate the commercialization of their R&D results. It has also horizontally connected Taiwan's three Science Parks with the Industrial Development Bureau, MOEA to speed up innovations, assisted in the upgrade and growth of existing biomedical manufacturers, and enhanced the international competitiveness of the biomedical industry.

The main achievements of 2019 are, as follows:

◆ Established the biochip surface modifications and metrology platform, the only platform in Taiwan, to assist the biochip startups to break through the bottleneck of surface modification technology, and to expand the services of Medical Device Accelerator to the precision medicine.

◆ Established a standardized "Image Quality Control" process to ensure that the image quality of laboratory radiography equipment (MRI, CT, C-arm X-ray machine, and ultrasound) meets the standard for radiography quality technology, and improved the quality of laboratory animal radiography services. Linked with layered manufacturing experiments to provide the reconstruction of two-dimensional medical images and the output of three-dimensional geometric shapes, and expanded the application of 3D printing in the medical devices and orthopedic devices. Considered the lightweight and bone healing requirements of the implants, completed the design and process verification procedures of titanium alloy porous structures, provided porous lightweight structure design services to the research and development teams, and accelerated the industrial development of customized 3D printing medical devices in Taiwan.

◆ In 2019, the platform assisted two manufacturers to gain international certification. One is the Stereotactic Guiding Surgical Devices of Brain Navi Biotechnology Co., Ltd. to gain the ISO 13485 certification, and the other one is the Ceramic Bracket of MEM Dental Technology Co., Ltd. to get the clearance of FDA 510(k), which effectively promoted the access of startups' products in the global market. It also assisted three teams' products to get IRB (Institutional Review Board) approvals for conducting clinical trials, and further accelerated the translation of research results into the clinical applications.

推動智慧製造關鍵技術之前瞻科技發展與應用計畫
Promotion of Smart Manufacturing Core Technology-Advanced Technology Development and Application Project

　　本計畫結合學研界合作開發智慧機械感測器與智能化技術，以國研院暨有實驗設施做為生產製造場域，導入智慧製造聯網與資料蒐集技術，串聯異質資訊系統，整合精密光學製造人員、物料、環境與製程之製造履歷及數據，提供數位製造與設計和高值化先進製造整合為主，以跨領域高質化與高值化智能製造技術為重點目標，整合跨領域資源，以支援高品質與高附加價值之智慧機械產業發展。

2019 年主要成果如下：

◆ 整合感測器功能測試平台暨感測器後端訊號分析與處理技術，透過感測器後端訊號為 M2M（機－機）與 H2M（人－機）間溝通橋樑，建構小型智慧工廠虛實整合技術，進行智能感測整合與回饋訊號分析，實測應用於消耗性器材如刀具等器械剩餘使用壽命之估計，據此擬訂更為優化之機台維運及保養策略。

◆ 儀科中心光學廠導入製造執行系統，蒐集環境參數與製造資料，並建置智慧製造大數據運算平台，進行影像辨識與場域監控應用。

◆ 完成智慧定心系統，並與清華、中興、中正團隊進行合作研究，提昇智慧機聯網團隊網路與儲存服務。並將液靜壓轉台技術導入成形系統，建立智慧成形系統平台，並已提供清大奈微所及動機系等團隊進行實驗測試。

This program has developed smart mechanical sensors and smart technologies through the cooperation with academic or research communities. The National Applied Research Laboratories and experimental facilities are used as the manufacturing field, also smart manufacturing networking and data collection technologies are introduced. In addition, heterogeneous information systems are connected, and the manufacturing history, data of personnel, materials, environment, and processes in precision optical manufacturing are integrated, which aims to combine digital manufacturing and design with high-value advanced manufacturing. This program has integrated cross-domain resources to support the development of high-quality and high-value-added smart machinery industries.

The main achievements of 2019 are as follows:

◆ Integrating sensor back-end signal analysis and the processing technologies of the sensor function test platforms. Through the back-end signal of the sensor, which is a communication bridge between M2M (machine to machine) and H2M (human to machine). By this program, the small-scale smart factory with virtual-physical integrated technology was constructed, which performed smart sensor integration and feedback signal analysis. The smart factory was applied to estimate the remaining useful life of consuming equipment, such as knives, and the machine could be maintain better.

◆ Manufacturing Execution System was introduced into TIRI Optical Factory, which collected environmental parameters and manufacturing data, and built a smart manufacturing big data computing platform for image identification and field monitoring applications.

◆ TIRI built the smart centering system, and cooperated with the National Tsing Hua University, National Chung Hsing University, and National Chung Cheng University to improve the networking and storage services of the smart machine networking team. Hydrostatic pressure turntable technology was introduced into the forming system and established the smart forming system platform, which has been provided to Institute of NanoEngineering and MicroSystems, and the Department of Dynamic Machinery of Tsing Hua University for experimental testing.
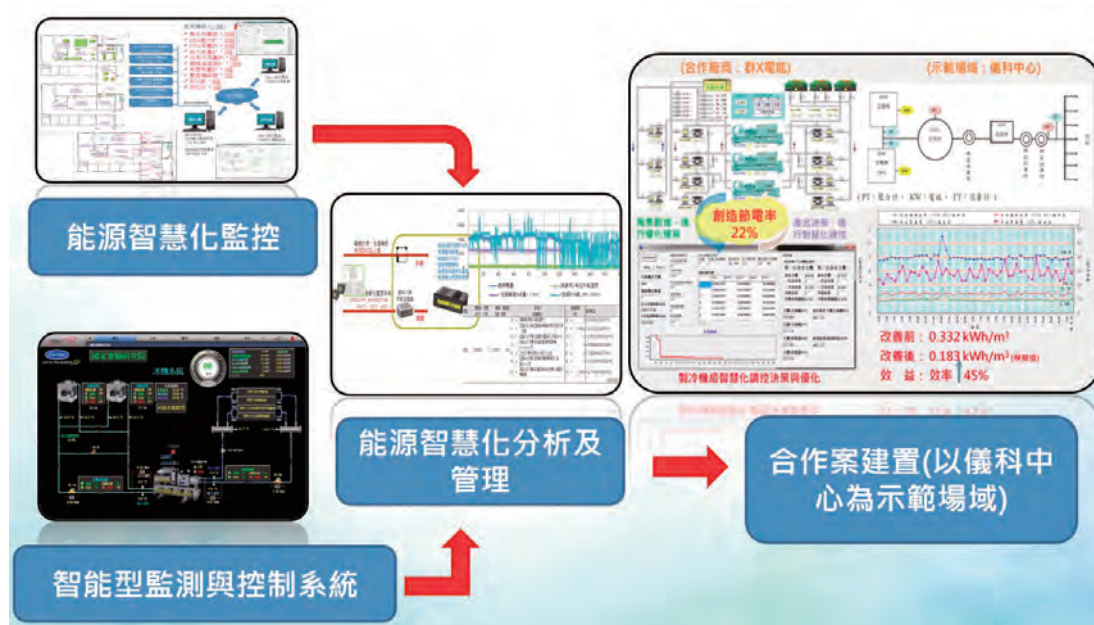
儀科中心光學廠示範場域之環境暨能源智能化監控系統
Intelligent environment and energy monitoring system for the demonstration site of the TIRI optical factory

Taiwan
Instrument
Research
Institute

TAIWAN INSTRUMENT
TIRI est. 1968

國際合作

International
Cooperation

Ministry of Scien

CONGRATULATIO

SUCCESSFUL SIGNING CEREMONY

BETWEEN

EDGECROSS
CONSORTIUM

NARLabs 國家實驗研究院
台灣儀器科技研究
Taiwan Instrument Research Institute

國際研究合作案
International Research Cooperation Projects

儀科中心透過與國際學研單位專案委託及共同研究方式進行初期合作，奠定未來正式合作之基礎，合作進度及效益整理如下表所列。

TIRI is conducting preliminary-stage commissioned projects and joint research with international academic and research units, and expects to establish a foundation for formal cooperation in the future. The following is a progress summary of cooperative projects.

合作單位 Cooperating Unit	合作題目 Subject of Cooperation	年度 Year
日本獨立行政法人理化學研究所 RIKEN, the Institute of Physical and Chemical Research, Japan	◆ 近紅外波段寬頻可調變式超穎材料 ◆ 100 THz 寬頻多層式三維超穎材料之開發 Development of N-IR broadband, multi-layer, three-dimensional metamaterials	2014—2020
捷克科學院物理研究所 Institute of Physics, Academy of Science (IoP, ASCR), Czech	◆ ALD 奈米疊層技術製備用於 NiTi 支架之高抗斷裂性 TiO_2/Pt 保護膜 Fracture-resistant TiO_2/Pt composite protective coating on NiTi stent by ALD nanolamination ◆ ALD 沉積高覆蓋保護層用於提升 NiTi 合金支架生物相容性 Atomic layer deposited TiO_2 and Al_2O_3 coatings on NiTi alloy	2014—2020
比利時微電子研究中心 Interuniversity MicroElectronics Center (imec), Belgium	先進影像與光學應用技術 Advanced Image and Optics Applications	2014—2020
優力國際安全認證有限公司 Underwriters Laboratories, USA	生醫環境與建置計畫 Biomedical environment construction project	2017—2020
義大利薩尼奧大學 Università degli Studi del Sannio, Italy	感測器資訊轉換器原型開發 Development of Analog-to-Information Converter (AIC) Prototype Board	2017—2020
新加坡增材製造創新中心 National Additive Manufacturing Innovation Cluster (NAMIC), Singapore	生醫應用與積層製造技術發展 Biomedical Applications and Additive Manufacturing Technology	2018—2020
泰國國家科技發展局 BIOTEC-IBST 實驗室 BIOTEC-IBST of National Science and Technology Development Agency (NSTDA), Thailand	精準醫療之快速基因檢測 Rapid Genetic Testing for Precision Medicine	2019—2020

簽署合作備忘錄夥伴
Cooperative Memorandum of Understanding

國研院以推動國際化、打造世界級實驗室為宗旨，儀科中心積極向外推廣技術能量，與世界各國產、學、研單位接軌，提升國際知名度，儀科中心近年來與下列國際單位簽訂合作備忘錄：

One of the missions carried by NARLabs is to establish a global and world-class R&D platform. TIRI actively promotes R&D capabilities to cooperate with industry, academic and research institutions in countries around the world to enhance its international visibility. TIRI currently has cooperative MOUs with the following units:

◆ 日本獨立行政法人理化學研究所
　 RIKEN, the Institute of Physical and Chemical Research, Japan

◆ 義大利薩尼奧大學
　 Università degli Studi del Sannio, Italy

◆ 優力國際安全認證有限公司
　 Underwriters Laboratories, USA

◆ 捷克科學院物理研究所
　 Institute of Physics, Academy of Sciences, Czech Republic

◆ 新加坡增材製造創新中心
　 National Additive Manufacturing Innovation Cluster (NAMIC), Singapore

◆ 比利時微電子研究中心
　 Interuniversity MicroElectronics Center (imec), Belgium

◆ 日本 Edgecross 聯盟
　 Edgecross Consortium (ECC), Japan

台泰雙邊研討會暨展覽於泰國科學園區舉辦
NSTDA-NARLabs Joint Workshop & Exhibition was held at Thailand Science Park

參與國際儀器科技組織運作
Involvement in the International Instrument Technology Organizations

儀科中心積極參與國際儀器科技組織，以提升國際知名度與組織地位重要性。中心所參與的國際組織茲列舉如下：

TIRI actively participates in international instrument technology organizations, and also hopes to enhance its own international visibility and status. Currently, TIRI participates in the following international organizations:

◆ 美國機械工程師學會台灣分會
   American Society of Mechanical Engineers (ASME) Taiwan Section
◆ IEEE 量測與儀器技術分會
   IEEE Instrumentation and Measurement Society (IMS) Taipei Chapter
◆ 實驗力學協會
   Society for Experimental Mechanics (SEM)
◆ 美國真空學會台灣分會
   American Vacuum Society (AVS) Taiwan Chapter

由儀科中心楊燿州主任（右三）帶領 IEEE 量測與儀器技術台北分會代表團參加於紐西蘭奧克蘭舉辦之 I2MTC 2019 國際研討會。
Led by direct general of TIRI, Prof. Yao-Joe Yang (third right), Delegation of IMS Taipei Section Chapter participated in I2MTC 2019 at Auckland, New Zealand.

泰國國家科學與科技發展委員會參訪竹北生醫園區儀科中心據點
Delegation of National Science and Technology Development Agency (NSTDA) from Thailand visited TIRI at Hsinchu Biomedical Science Park

Taiwan Instrument Research Institute

技術服務

Technical Service

儀器系統開發及關鍵元組件委託研究與委製服務
Commissioned Research and Manufacturing Service for Advanced Instrument and Key Component

　　除了自主儀器技術的開發，儀科中心秉持支援學術研究、服務產業界宗旨，提供真空、光學、光機相關儀器及關鍵零組件之委研、委製、校測等技術服務，2019 年提供產學研各界檢測與委製服務累計共 1,930 件，接受各界委託，運用儀器科技協助進行前瞻研究並解決產業問題。

Not only have we constantly developed our own instrumentation technologies, but in compliance with our goal of supporting academic research and serving industry professionals, TIRI provides OEM and calibration services for vacuum instruments, optical system, and key components. In 2019 we provided a total of 1,930 testing and OEM services to enterprises, universities and research institutes. TIRI is commissioned by various industries to conduct foresight research and solve problems with its advantages in the field.

(1) 學界委託計畫 Commissioned Research Projects from Academia

　　支援學術前瞻研究，推動國家科技發展，透過長年與國內各大專院校的研發合作，儀科中心是台灣學術界的最佳盟友與幕後推手。2019 年學界合約案件數眾多，僅列舉部分於下表。

Supporting academic research, promoting national technology development, and conducting long-term R&D cooperation with domestic universities have made TIRI the best ally and driving force for academia in Taiwan. There were a lot of projects for academia in 2019, only some of whom are listed below.

委託計畫 Project Title	合作對象 Partner
高解析率紫外曝光機鏡組開發 High Resolution UV Band Lens of Mask Aligner	國立臺灣大學 National Taiwan University
AQI 氣體感測器服務平台專案計畫 AQI Gas Sensor Service Platform Project	國立清華大學、國立交通大學、國立成功大學等 5 校共計 8 個研究團隊共同參與計畫 8 research teams from 5 schools (such as NTU, NTHU, NCKU, and so on) are joint in this project.
電腦自動亂針繡之針跡生成研究 Stitch File Automatic Generation System for Image Irregular Needling Machine Embroidery	國立成功大學 National Cheng Kung University
基於機器學習於智慧路燈的自主監測系統開發 Early Warning Street Light Automatic Transformation Prediction System	國立臺灣海洋大學 National Taiwan Ocean University
使用於大口徑太空望遠鏡頭之準直儀光機設計與調校技術開發 Development of Collimator Design and Testing Technology for Meter-scale Space Telescope	逢甲大學 Feng Chia University
3D 列印金屬骨植入產品全製程開發 Process of 3D Printing Metal Bone Implants	義守大學 I-Shou University

(2) 產業界委託計畫 Commissioned Research Projects from Industry

儀科中心以驅動儀器設備在地化為使命，積極擴散研發能量，鼓勵中心研發團隊解決產業界需求，透過橋接學界與業界，以產學合作方式，促使國家產業技術升級，並厚植及深根國內儀器技術。2019 年產界合約案件數眾多，僅列舉部分於下表。

Aiming to localize the instrumentation technology TIRI promotes its R&D capability actively and encourages its teams to respond to the industrial demands. By industry-university-institute cooperation, TIRI is capable of bridging universities, institutes and industries, and thus promoting the domestic industry upgrading and instrumentation technology developing. There were a lot of industrial projects in 2019, only some of whom are listed below.

委託計畫 Project Title	合作產業類別 Type of Industry
微流體與生醫晶片整合技術 Technology of Integrating Micro Fluidic and Bio-medical Chip	電子零件產業 Electronic component industry
曝光機之光學元件開發製作 OEM of Mask Aligner Optical Components	半導體製造業 Semiconductor fabrication industry
原子層沉積 / 蝕刻系統委製案 Atomic Layer Deposition/ Etching System OEM Project	半導體產業 Semiconductor industry
生醫產品開發及驗證 R&D and Testing Service of Bio-medical Products	醫療生技產業 Medical biotechnology industry
結合 AI 影像辨識及雲端技術之醫療病理影像檢測儀器 Combined AI Image Recognition and Cloud Technology with Digital Image Correlation Method for Medical Pathology Image Recognition Instrument	醫療院所 Medical institution
雷射加工系統之光學鏡片製作 Manufacturing of Optical Lens for the Laser Processing System	精密機械業 Precision Machinery

TAF 認證實驗室的校正與測試服務
TAF Certification Laboratories

儀科中心建置並持續維持 TAF 認證實驗室，提供真空標準的校正與光電檢校測試服務，服務對象包含產、官、學、研各界，每年提供逾百件認可校正報告服務。另外，生醫平台實驗室的電子醫療器材認證多達 19 項。儀科中心所提供的 TAF 校正與測試服務項目詳列於儀科中心官網：https://www.tiri.narl.org.tw/Service/Taf，動態更新相關檢校項目。

TIRI has established and kept maintaining TAF Certification Laboratories to provide standard vacuum

calibration, and optoelectronic inspection and testing services with more than 100 recognized calibration reports annually. In addition, there are as many as 19 electronic medical device certificates of biomedical platform laboratories. The TAF calibration and testing service items are shown on the TIRI website below: https://www.tiri.narl.org.tw/Service/Taf.

人才培育
Talent cultivation

儀科中心致力培育我國儀器研發高階人才，方式包括開放研究生參與研究計畫，及承接「重點產業高階人才培訓與就業計畫」，促成跨領域整合研究與培育儀器科技人才；舉辦學生儀器競賽、科普活動以及提供教學參訪行程等，落實科研教育向下扎根；以演講或短期訓練講座方式，積極參與學研界活動，以達知識擴散之目標。

同時透過開辦各種專業研訓課程與研討會，培育國家科研基礎人才的質與量，厚植高科技產業技術人才。2019 年舉辦的研習班與研討會達 30 場。包括「ALD Workshop」、「2019 MEMS Short Course」、「真空技術研討會」、「儀器技術訓練課程」等，以及醫材創新輔導方面課程，如「歐盟新法規 MDR 研討會」。

TIRI has cultivated outstanding professional talents for domestic academia via various workshops and seminars, and cultivated research manpower required by high-tech industry such as "Rebuild After PhD's Industrial Skill & Expertise (RAISE) Project" in order to enhance the quality and quantity of talents as the foundation for scientific research of our country. There were as many as 30 workshops and seminars organized in 2019, including "ALD Workshop", "2019 MEMS Short Course", "Workshop on Practical Vacuum Technology" and "Instrument Technology Training Course". And there were courses related to counseling of innovation of medical instrument, such as "Seminar on EU Medical Devices Regulation (MDR)".

儀科中心開辦各種專業研訓課程與研討會，培育國家科研基礎人才
TIRI has cultivated outstanding professional talents for domestic academia via various workshops and seminars.

2019 年儀科中心年報
TIRI Annual Report 2019