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Technology Transfer Office



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TTO NEWSLETTER

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Success Story

Fast-reconfigurable large-area interference lithography
nanopatterning platform | Developed by Dr Wen-di Li's team

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SUCCESS STORY

Fast-reconfigurable large-area interference lithography nanopatterning platform

Gold medal winning invention at Geneva IEIG offers a turn-key solution that is faster and cheaper than conventional nanopatterning techniques.



Dr Wen-Di Li, PhD student Mr Zhuofei Gan (From Left to Right)

Department of Mechanical Engineering,
Faculty of Engineering

Augmented reality glasses, head-up displays, and many other emerging consumer applications rely on high-resolution nanostructures precisely created over a large area. These nanostructures are difficult and expensive to manufacture using existing mask aligners and electron beam lithography machines.



the nanopatterning prototype

A new fiber-optic, two-beam interference lithography technology has now been invented and can create well-ordered fine nanostructures using interference fringes generated from overlapping coherent laser beams emitted from optical fibers. This allows for fast, low-

cost nanopatterning over large areas and enables the commercialization of automated turn-key nanopatterning tools for both the industry and research institutes, which can reduce the cost and processing times of patterning periodic nanostructures by tenfold compared with leading electron beam writers.

This new technology was invented by Dr Wen-Di Li, PhD student Mr Zhuofei Gan and other team members from the Department of Mechanical Engineering, Faculty of Engineering.

The invention was a gold medal winner at the International Exhibition of Inventions of Geneva (IEIG), which was held virtually in March this year. This prestigious annual event is devoted exclusively to inventions and innovations. More than 780 inventions from around the world were evaluated by a panel of professional judges at this year's event.

A key feature of the invention is the use of fiber-optic components for splitting, guiding and emitting the two coherent laser beams, which then overlap on the sample stage to form nanopatterns. Computer-controlled motors drive the fiber ports and allow easy and fast adjustment of the nanostructure pitch.

Another key feature is an active stabilization algorithm with closed-loop feedback hardware, which locks the interference pattern and allows a high pattern contrast. This enables high-quality fabrication of wafer-scale, high-resolution, and high-aspect-ratio nanostructures, and also allows reliable prediction and analysis of patterning quality through a home-designed

numerical exposure model.

"Our new nano-patterning prototype demonstrates versatile functionalities, with computer-controlled sample stage and exposure shutter. By rotating the sample for double or multiple exposures, we can create various two-dimensional nanostructures," said the team. Potential applications of these nanostructures include innovative displays, semiconductor manufacturing, droplet manipulation, ultrasensitive molecular sensing, just to name a few.

The invention is the result of eight years of research by the team. It allows the long-standing, conventional interference lithography technique, which can only be used as an experimental set-up in optics labs, to be transformed into a turn-key nanopatterning machine, with the additional benefits of lower costs and faster processing times.

With assistance from the TSSSU program and support from the HKSTP Incu-Tech program, the team has set up a company, InterLitho Technology Limited. The company will focus on developing commercial nanopatterning products and providing high-end nanomanufacturing services to academic and industrial customers based on its award-winning nanofabrication technologies developed at HKU. InterLitho's first commercial nanopatterning product was recently delivered to an augmented reality display company. InterLitho strives to expand the range of uses of the inventions developed at HKU to explore broader applications of advanced nanofabrication techniques.

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LATEST PATENTS FILINGS

24 May 2022 - 19 June 2022

- IP01031 USR filed on 24 May 2022
Dr. PAN Jia , A crowd-driven mapping, localization and social-friendly navigation system
- IP00784 HK Standard Application filed on 25 May 2022
Dr SHUM Ho Cheung, Anderson , Systems for Automated Handling of Fluid Samples into Microfluidic Droplets for In Vitro Diagnostic
- IP01173 HK Short-term Application filed on 25 May 2022
Prof. Zhang Tong (Civil Eng); COMPOSITIONS AND METHODS FOR THE RAPID DETECTION OF SARS-COV-2 VARIANTS IN WASTEWATER
- IP00851 EP regional phase filed on 25 May 2022
Prof LEUNG Ka-Li Frankie , MOTOR-DRIVEN FIXATOR TO APPLY MICROMOTION TO FRACTURE SITE TO ACCELERATE BONE HEALING
- IP01034 PCT filed on 25 May 2022
Prof. CHAU Hoi Fung, Improving Classical And Quantum Free-Space Communication By Adaptive Optics And By Separating The Reference And Signal Beams
- IP01034 TW filed on 26 May 2022
Prof. CHAU Hoi Fung, Improving Classical And Quantum Free-Space Communication By Adaptive Optics And By Separating The Reference And Signal Beams
- P01192 USP filed on 26 May 2022
Dr. CHUNG, Yik Sham Clive; N-ACRYLOYLINDOLES AND METHODS OF USE
- IP01185 USP filed on 26 May 2022
Dr. CHOW Shing Fung; NOVEL COCRYSTALS OF DEXAMETHASONE
- IP01054 PCT filed on 27 May 2022
Prof. Barbara CHAN, BIOENGINEERED DERMAL PAPILLA AND HAIR FOLLICLES AND RELATED PRODUCTS, METHODS AND APPLICATIONS
- IP00966 (CN) HK standard patent application filed on 30 May 2022
Prof. HUANG Mingxin; 一种抗菌抗病毒含铜不锈钢及其制备和应用
- IP00817 CN national filed on 30 May 2022
Prof CHAN Chi-Fung, Godfrey; Mesenchymal Stromal Cells As A Reprogramming Source For Ipsc Induction
- IP01050 PCT Filed on 31 May 2022
Prof. CHE Chi-Ming; DINUCLEAR PLATINUM EMITTER COMPLEXES AND METHODS OF MAKING AND USING THEREOF
- IP01051 PCT filed on 31 May 2022
Prof. CHE Chi-Ming; DINUCLEAR PLATINUM(II) RED EMITTERS FOR OLED APPLICATIONS
- IP01052 PCT filed on 31 May 2022
Prof. CHE Chi-Ming; THERMALLY ACTIVATED DELAYED FLUORESCENT PALLADIUM(II) COMPLEXES FOR OLED APPLICATIONS
- IP01041 CN national phase filed on 31 May 2022
Prof CHOW, Billy Kwok Chong; MRGPRX2 ANTAGONIST FOR THE TREATMENT OF PSEUDO ALLERGIC REACTIONS
- IP00817 US national phase filed on 31 May 2022
Prof CHAN Chi-Fung, Godfrey; Mesenchymal Stromal Cells As A Reprogramming Source For Ipsc Induction
- IP01189 USP filed on 31 May 2022
Prof. CHU Chun Hung, Copper Diamine Fluoride (CDF): A cariostatic agent
- IP01191 USP filed on 31 May 2022
Prof. CHE Chi-Ming, Synthesis and uses of Ginsenoside Compound K Derivatives
- IP01190 USP filed on 2 Jun 2022
Dr. XU Lizhi, Breathable and Skin-Conformal Electronics with Hybrid Integration of Microfabricated Multifunctional Sensors and Kirigami-Structured Nanofibrous Substrates
- IP01196 USP filed on 2 Jun 2022
Dr. TSE Edmund Chun Ming, CuDATA Catalyst for Nitrate Electroreduction to Generate Ammonia
- IP01073 US Non-Prov filed on 3 Jun 2022
Prof. WU Chuan , Smart Walker
- IP00906 EP regional phase filed on 7 Jun 2022
Prof CHEUNG Kenneth Man-Chee; Devices and Methods for Orienting a Surgical Device
- IP01112 USP filed on 8 Jun 2022
Prof. Anskar LEUNG, ZEBRAFISH MODEL OF HUMAN DISEASE AND METHOD OF USE THEREOF
- IP01096 PCT filed on 8 Jun 2022
Dr. WANG Yufeng; Application of metallo-supramolecular branched polymer in cryo-EM sample preparation
- IP01064 PCT filed on 9 Jun 2022
Dr WANG Weipin. A PHOTORESPONSIVE PROTEIN DELIVERY SYSTEM BASED ON A MODIFIED PAMAM AND METHODS THEREOF
- IP01065 PCT filed on 9 Jun 2022
Dr TANG Jinyao, Optical Responsive Full Color Shifting Colloidal Ink
- IP00851 CN national phase filed on 9 Jun 2022
Prof LEUNG Ka-Li Frankie , MOTOR-DRIVEN FIXATOR TO APPLY MICROMOTION TO FRACTURE SITE TO ACCELERATE BONE HEALING
- IP00851 US national phase filed on 13 Jun 2022
Prof LEUNG Ka-Li Frankie , MOTOR-DRIVEN FIXATOR TO APPLY MICROMOTION TO FRACTURE SITE TO ACCELERATE BONE HEALING
- IP01061 PCT filed on 13 Jun 2022
Prof Xi Ning, Fall risk Assessment Device

EVENT HIGHLIGHTS

Our upcoming open house focuses on inventors in the biotech field. Don't miss this opportunity to have one-on-one talks with our colleagues about your invention or start-up! You can also find out about market evaluation, promotion and commercialisation, and intellectual property and licensing.

This physical event will take place on 6 July, 3-5 pm at the Li Ka Shing Faculty of Medicine, Seminar Room 4, G/F Lab Block, 21 Sassoon Road, Pok Fu Lam.

[Click to register!](#) (Pre-registration is required)

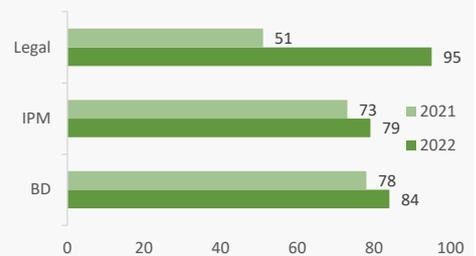
PROGRESS UPDATE

Cases completed by the Legal Team rose substantially, with 95 cases completed in May, up from 51 in May 2021. The team handled 37 collaboration agreements, up from 10 last year, and 16 service agreements, up from 5. Research agreements rose to 11 from 4 last year.

The IPM Team filed 28 USP/PCT/national applications in May, up from 23 last year. The team received 10 IDFs, handled 26 office action matters and presented 15 Conversion/National Phase/National Validations cases in committee meetings.

The BD Team had 84 cases in hand in May. Marketing and outreach activities doubled to 14 from 7 last year. Entrepreneurship and start-up company support increased to 5, up from 3 last year.

Total Engagements and Handling Cases



TECHNOLOGY COMMERCIALISATION

Top 3 revenue-booked IPs in May 2022

Item	IP Type	PI	Faculty
New Antibacterial Cyclic Lipopeptides	US Patent No. US 10,647,746 PRC Application No. 201780035657.3 US Application No. 16/310,364	Prof Xuechen Li	Sciences
SARS-CoV-2 detection	Contract Research/Consultancy	Prof. Honglin Chen	Medicine
Study of Using AI for Social Media Data Analysis	Contract Research/Consultancy	Dr. Adela Lau	Statistic & Actuarial Science

TRANSFERRING YOUR NEW TECHNOLOGIES INTO BUSINESS OPPORTUNITIES

POLICY STIPULATION

The latest policy stipulates that the net receipts arising from the exploitation of an Invention are shared among the University, the relevant faculty/department and the inventor(s) in the ratio of 1/3 : 1/3 : 1/3. It aims to encourage the researchers at HKU not only to excel in academic performance but also to apply their technology for the benefits of mankind with an impressive reward.

HOW TO APPLY: 4 PHASES FOR RESEARCH PROJECTS

Phase 1: Initial project negotiation

1. PI will negotiate with their collaborator(s) and confirm a project proposal which includes the scope, budget and duration of the project.

2. PI will negotiate with their collaborator(s) and prepare a draft agreement (Agreement templates are available at the website of the Research Services (RS): <http://www.rss.hku.hk/contracts/contractresearch/templates>).

Phase 2: Endorsement from department/faculty

3. PI will submit the project proposal, the draft agreement, and the information form/grant application form to their department/faculty to seek an approval (The information form for research/consultancy agreements is available at: <http://intraweb.hku.hk/local/rss/tto/researchor-consultancy-agreements-form.doc>).

4. After obtaining the approval, PI will

submit the project proposal, the draft agreement, and the information form/grant application form to the Research Service (RS).

Phase 3: Financial legal/IP review

5. The RS will distribute the project proposal and the draft agreement to the Finance and Enterprises Office (FEO) for financial review and to the Technology Transfer Office (TTO) for legal review.

6. If there is any financial/legal issue, the FEO/TTO will inform PI through the RS. PI will negotiate with their collaborator(s) on the financial/legal issue until it is settled.

Phase 4: Signature and document archiving

7. After consolidating the settled project proposal and the agreement, the RS will proceed to the signature process.

8. After duly performing the signature process, the RS will assign the RCGAS number(s) for opening the project account(s)

ABOUT US

About HKUTTO

The Technology Transfer Office (TTO) is committed to maximising the impact of research through technology transfer at both the institutional and industrial levels. TTO works closely with researchers at HKU to commercialise their inventions through professional consultation on business development, legal advice and assistance, as well as patent application filings. Your inventions will not benefit society unless they are mass produced.

About Versitech

Versitech Limited is the commercial arm of HKU. Versitech negotiates, executes and manages commercial business contracts and agreements on behalf of the University.

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