HKU E-TECH NEWS
- Metal Hydroxides Actuation Material used as Artificial Muscles in Microrobots or Actuator in Cooling Electronics

EVENTS HIGHLIGHT
- GBA Innovation Summit

LATEST PATENTS FILINGS

PROGRESS UPDATE

TECHNOLOGY COMMERCIALISATION
Metal hydroxides actuation material used as artificial muscles in microrobots or actuator in cooling electronics

Reference: IP00840

The world's first material system that can be actuated directly by visible light and electricity without additional fabrication procedures.

**BACKGROUND**
- Many material systems are capable of producing actuation when driven by electricity, yet electrical wiring and additional components, such as electrolyte and electrodes, are required, which would limit their applications.
- Therefore, materials capable of producing actuation when stimulated not only by electricity, but also by light & heat are of great interest because they can offer tremendous potential in applications as wireless actuators for microrobots.
- A few materials have been found to have light-triggered actuation properties before, but most of these are powered by ultraviolet (UV) or near-infrared (NIR) light.
- Other light or heat-sensitive materials have very slow actuation responses that may take tens of seconds to fully actuate, or they require very high light intensities yet produce rather low actuating stress.

**TECH OVERVIEW**
The invention is a type of miniaturized actuators, made of metal hydroxides supported by specially selected passive layer (Figure 1), which could function to producing huge and stable force and displacement under electrical/light/heat stimulations.

![Fig. 1 Example 1: Ni(OH)2/NiOOH deposited on a passive layer (e.g. Ni) by anodic electrodeposition](image)

It is the world’s first material system that can be actuated directly by visible light and electricity without additional fabrication procedures (Figure 2).

![Fig. 2 (Left) A mini arm with two actuating hinges lifting a weight 50 times heavier than itself under light; (Right) Actuating force of a 0.3-mg nickel hydroxide-oxyhydroxide actuator under periodic light](image)

It can be applied in microrobots or microscale devices in which conventional actuators are too bulky to be used. It can also be used as actuator for innovative cooling electronics.

**APPLICATION**
- Artificial muscles in microrobots
- Actuators decoration use like flameless candles
- Actuator for in cooling electronics
- Application in auto focus lens

**PATENTS**
- PCT Application No. PCT/CN2020/074261

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IP00829 Dr FENG Shien-Ping; ME (CN application filed on 29 Apr 2021) Synthesis and application of light management with thermochromic hydrogel microparticles

IP00908 Dr SU Yaoming; Dentistry (CN application filed on 30 Apr 2021) Novel microwave array loaded with anti-PD-L1-cisplatin-nanoparticles for synergetic cancer immunochemotherapy

IP00910 Dr TANG Liewellyn; Real Estate and Construction (PCT filed on 30 Apr 2021) Autoobject: a dense 3D modelling method for BIM object production from RGB-D videos

IP00918 Dr ZHANG Fu; ME (PCT filed on 30 Apr 2021) A Way to Save UAV's Energy Consumption and Improve Its Hovering Accuracy

IP00970 Prof CHEN Honglin; Microbiology (PCT filed on 27 May 2021) Live Attenuated Influenza B Virus Compositions Methods of Making and Using Therewithof

IP00985 Prof. HUANG Mingpin; ME (PCT filed on 6 May 2021) Strong and Ductile Medium Manganese Steel Produced Through Warm rolling, Cold rolling and Annealing

IP00752 Dr KWOK Kla Wai; Mechanical Engineering (HK standard application filed on 6 May 2021) Fluid Powered Master-Slave Actuation for MRI-Guided Interventions

IP00919 Dr CHENG Kwok Yung; Computer Science (CN application filed on 8 May 2021) A Virtual 3D Object Production System Based on RGB-D Information

IP00790 Prof CHEN Honglin; Microbiology (US provisional filed on 17 May 2021) Live Attenuated Influenza B Virus Compositions Methods of Making and Using Therewithof

IP00962 Prof YUEN Kwok-Yung; Microbiology (PCT filed on 10 May 2021) Compositions and Methods for Broad Spectrum Anti-Viral Therapy

IP00970 Prof. YAM Vivian Wire Wah; Chemistry (US provisional filed on 10 May 2021) Luminescent Gold(III) Compounds with Thermally Stimulated Delayed Phosphorescence (TSDP) Property For Organic Light-Emitting Devices and Their Preparation

IP00790 Prof CHEN Honglin; Microbiology (Canadian application filed on 13 May 2021) Live Attenuated Influenza B Virus Compositions Methods of Making and Using Therewithof

IP00790 Prof CHEN Honglin; Microbiology (PCT application filed on 14 May 2021) Live Attenuated Influenza B Virus Compositions Methods of Making and Using Therewithof

IP00964 US; Dr CHOI Hoai Wai; EEE (US divisional filed on 17 May 2021) Strain-inducing Nanostructures for Spectral Red-shifting of Light Emitting devices

IP00967 Prof. YUEN Kwok-Yung; Microbiology (US provisional filed on 14 May 2021) Dry powder formulation of tamaritabone for pulmonary and intranasal delivery

IP00946 Dr WANG Weiping; Dr. Ji Dal-Sum Research Center (US provisional filed on 14 May 2021) Method and apparatus for improving the performance of hydraulic motors for MRI-guided robotic systems

IP00953 Prof. YUEN Kwok-Yung; Microbiology (PCT filed on 21 May 2021) The first generation of synthetic vaccine against Staphylococcus aureus infection

IP00970 Prof CHENG Honglin; Microbiology (US regular filed on 17 May 2021) Live Attenuated Influenza B Virus Compositions Methods of Making and Using Therewithof

IP00924 Prof WANG Liqiu; ME (US provisional filed on 28 May 2021) Self-Cleaning Pathogen-Repellent Coatings

IP00947 Dr Song You-Giang; School of Biomedical Sciences (US provisional filed on 21 May 2021) Targeting Plaques Pathway: Linking Amyloid β Plaques and Neurofibrillary Tangles by using Palbociclib and Aipigen in Alzheimer's disease mouse

IP00954 Prof. CHAN Barbara; Mechanical engineering (US provisional filed on 27 May 2021) Bioengineered dermal papilla and hair follicles – Products, Methods and Applications

IP00940 Prof LIU Wei; Pathology (US provisional filed on 29 May 2021) Use of cardiolipin as immune adjuvant

The Legal team worked on 101 cases (including 56 new ones) in April, compared to 89 cases in April 2020. In May, they handled 164 cases (113 new ones), up from 111 a year earlier. The IP management team processed 31 IDFs in April and May, up from 19 for the same two months in 2020.

The Business Development team handled a total of 150 projects in April and May, up from 140 in the same two months last year.

HKU Technology Transfer Office took part in the GBA Summit of the StartmeupHK Festival on May 25. The virtual Festival connects Hong Kong’s star-up with like-minded businesses, governments and stakeholders from around the globe.

On June 24, Justin Di-Lang Ho, co-founder of Momentus Robotics Limited, which develops high-performance MR-safe hydraulic motors for MRI-guided robotic systems, shared his team’s technology transfer story as well as trends and updates.

**PROGRESS UPDATE**

**TOTAL ENGAGEMENTS AND CASES HANDLED**

- April 2020: 73
- May 2020: 52
- April 2021: 89
- May 2021: 70

**TOTAL ENGAGEMENTS AND CASES HANDLED**

- April 2020: 114
- May 2020: 113
- April 2021: 105
- May 2021: 78

**TOP 3 REVENUE-BOOKED IP'S IN APRIL AND MAY 2021**

1. **A Live Strain of Staphylococcus Aureus and Uses Thereof**
   - US Provisional Application No. 63/028,710
   - US Provisional Application No. 63/123,635
   - PI: Prof. Jiandong Huang
   - Faculty: Medicine

2. Sewage surveillance for COVID-19: testing methods, classification scheme, data interpretation and use
   - US Provisional Application No. 63/135,262
   - HK Application No. 32021024316.0
   - PCT Application No. PCT/ CN2021/074675
   - PI: Ir Prof. Tong Zhang
   - Faculty: Engineering

3. **Versitech e-Form Computer Software**
   - Consultancy Service
   - PI: Prof. Honglin Chen
   - Faculty: Medicine

**LIST OF TECHNOLOGIES LICENSED IN APRIL AND MAY 2021**

<table>
<thead>
<tr>
<th>Item</th>
<th>IP Type</th>
<th>PI</th>
<th>Faculty</th>
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<td>A Live Strain of Staphylococcus Aureus and Uses Thereof</td>
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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).