Department of
Mechanical Engineering
香港城市大學
City University of Hong Kong

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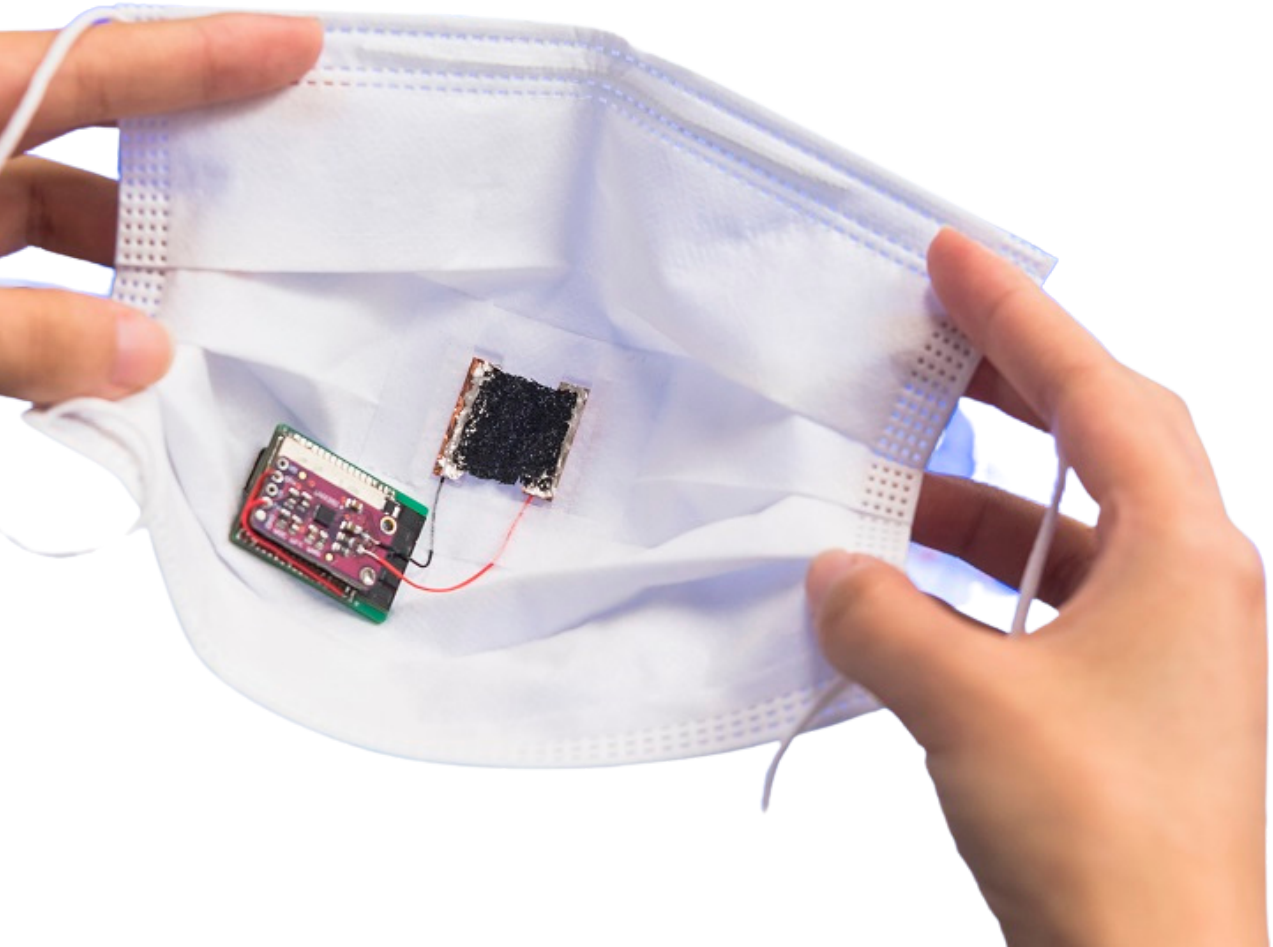
MNE Newsletter



Welcome from the Department

The WINTER issue

Saeason's Greeting from the Department of Mechanical Engineering. We hope you had a wonderful holiday season and are refreshed to be ready to tackle the new year.

As we look ahead, we feel more optimistic about the post-pandemic future. While the past year has been challenging for everyone, we will soon be able to return to a normal way of life. In the meantime, we encourage everyone to continue practising safe health measures to protect ourselves and our loved ones. That is why there will be some pandemic focus projects highlighted in this issue.

We want to express our heartfelt gratitude to all our students, faculties, and staff for your resilience and determination during these challenging times. Together, we have persevered and will continue to do so in the year ahead.

Wishing you all a bright and prosperous 2023!

IN THIS ISSUE

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People Stories

Prof. LI Wen Jung

Prof. LI You Fu

In this issue, we are pleased to introduce two of our outstanding faculties:

- Prof. LI Wen Jung - Chair Professor of Biomedical Engineering and Associate Provost (Resources Planning)
- Prof. LI You Fu - An expert on Robotics and Computer Vision

Prof. LI Wen Jung

Chair Professor of Biomedical Engineering

Research Interests:

- E-Skin and Wearable Micro/Nano/Bio Sensors
- AI-Sensors for Healthcare and Sport Analytics
- AI Image Processing for Scanning Super-resolution Microscopy
- Electro-kinetics-based Cancer/Stem Cell Separation and Identification

Prof. LI Wen Jung was educated at the University of Southern California (BS and MS in Aerospace Engineering in 1987 and 1989, respectively) and the University of California, Los Angeles (PhD in Aerospace Engineering in 1997). He is currently Chair Professor at the Department of Mechanical Engineering and concurrently serving as Associate Provost (Resources Planning) of the City University of Hong Kong (CityU). Before joining CityU, he was with the Department of Mechanical and Automation Engineering of The Chinese University of Hong Kong (CUHK) from 1997 to 2011. Before joining CUHK, he held research and development positions at the NASA/Caltech Jet Propulsion Laboratory (Pasadena, USA), The Aerospace Corporation (El Segundo, USA), and Silicon Microstructures Inc. (Fremont, USA). He received a NASA Technical Innovation Award (group award), an Aerospace Corporate Fellowship, and a Silicon Microstructures Employee Award for his contributions to those organisations. His academic honours include IEEE Fellow, ASME Fellow, Asia-Pacific Artificial Intelligence Association (AAIA) Fellow, and 100 Talents of the Chinese Academy of Sciences. He served as the President of the IEEE Nanotechnology Council (2016 and 2017) and as the Founding Editor-in-Chief of IEEE Open Journal on Nanotechnology (2019–2022) and IEEE Nanotechnology Magazine (2007–2013).

He has published more than 170 journal papers, 180 IEEE conference papers, 2 books, and 5 book chapters related to MEMS, nano-sensors, and robotics. Some of his research results have been published in prestigious journals, such as Science Advances, Nature Communications, Nature Machine Intelligence, Nature Methods, Advanced Energy Materials, Advanced Healthcare Materials, Advanced Intelligent Systems, Advanced Science, IEEE/ASME Journal of Microelectromechanical Systems, and IEEE Internet of Things Journal.

Prof. LI has led more than 40 research projects as PI and 15 projects as Co-I since 1999. He currently holds 20 patents (in the US, the EU, and China), with 7 more (in the US and China) pending in the field of micro-/nano-technologies and AI-sensor based motion analytics. Based on IPs generated at CityU and CUHK, he has co-founded four start-ups since 2004 with his students, which have created innovative intelligent sensing products for human-machine-interface motion engines, for the construction and aerospace industries, and more recently for sports education management. These companies have won awards such as the 'Best Innovative Technology Project Award' from the China Hi-Tech Fair in 2020, the 'Gold Award of the 2018 World IoT Expo', and the 'Grand Award of The 14th HKEIA Award for Outstanding Innovation and Technology Products'. These companies' businesses now cover more than 50 countries and regions and serve more than 5,000 customers.

Prof. LI has also held affiliated/adjunct/guest professorships at the University of Toronto, Peking University, the Huazhong University of Science and Technology, the Beijing Institute of Technology, Xiamen University, the Changchun University of Science and Technology, Northeastern University, and the Shenyang Institute of Automation, Chinese Academy of Sciences.

Prof. LI You Fu

Professor

Research Interests:

- Robot vision
- Visual tracking
- Robot sensing

Prof. LI You Fu obtained his B.S. and M.S. degrees in electrical engineering from Harbin Institute of Technology China. He obtained the PhD degree from the Robotics Research Group, Dept of Engineering Science of the University of Oxford in 1993. From 1993 to 1995 he was a postdoctoral research staff in the Dept of Computer Science, University of Wales, Aberystwyth, UK. He joined City University of Hong Kong in 1995 and is currently a professor in the Department of Mechanical Engineering. His research interests include robot sensing, robot vision, 3D vision, visual tracking, sensor guided manipulation, mechatronics and automation. In these areas, he has published over 180 papers in SCI listed international journals. Prof. Li has received many awards in robot sensing and vision including IEEE Sensors Journal Best Paper Award by IEEE Sensors Council, Second Prize of Natural Science Research Award by the Ministry of Education, 1st Prize of Natural Science Research Award of Hubei Province, 1st Prize of Natural Science Research Award of Zhejiang Province, China. He was on Top 2% of the world's most highly cited scientists by Stanford University, 2020. He has served as an Associate Editor of IEEE Transactions on Automation Science and Engineering (T-ASE), Associate Editor of IEEE Robotics and Automation Magazine (RAM), Editor of the IEEE Robotics Automation Society's Conference Editorial Board (CEB) and Guest Editor of IEEE Robotics and Automation Magazine (RAM). He is a fellow of IEEE.

> **Top 2% most highly cited scientists by Stanford University**

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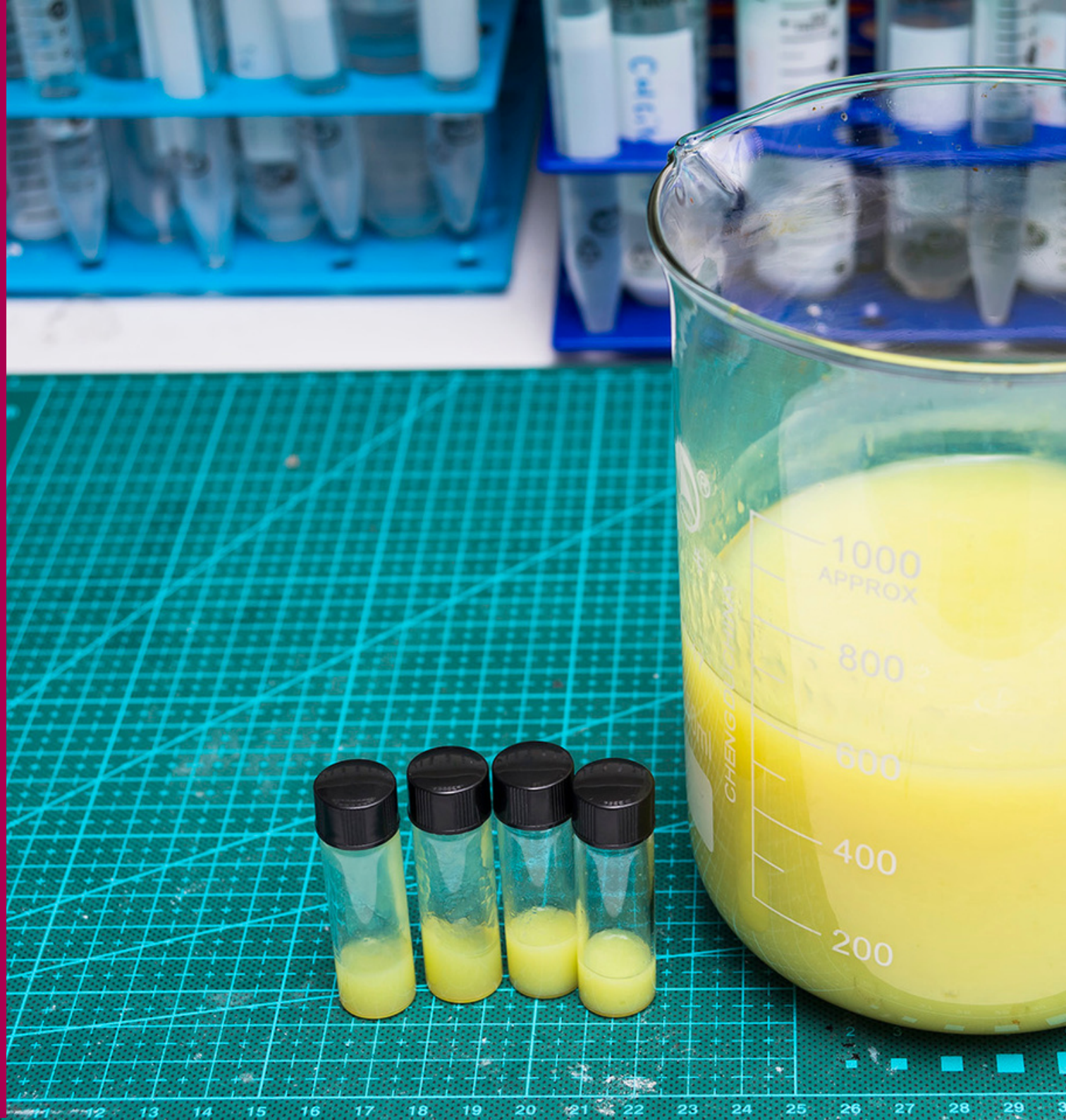
Research Highlight

- Novel electrocatalysts for hydrogen production offer hope for solving the energy crisis
- Smart mask to track respiratory sounds for respiratory disease identification
- Self-charging electrostatic face masks leveraging triboelectrification for prolonged air filtration
- Achieving thermally stable nanoparticles in chemically complex alloys via controllable sluggish lattice diffusion
- Whisk-Inspired Motion Converter for Ocean Wave Energy Harvesting



Novel electrocatalysts for hydrogen production offer hope for solving the energy crisis

Solving the green premium problem

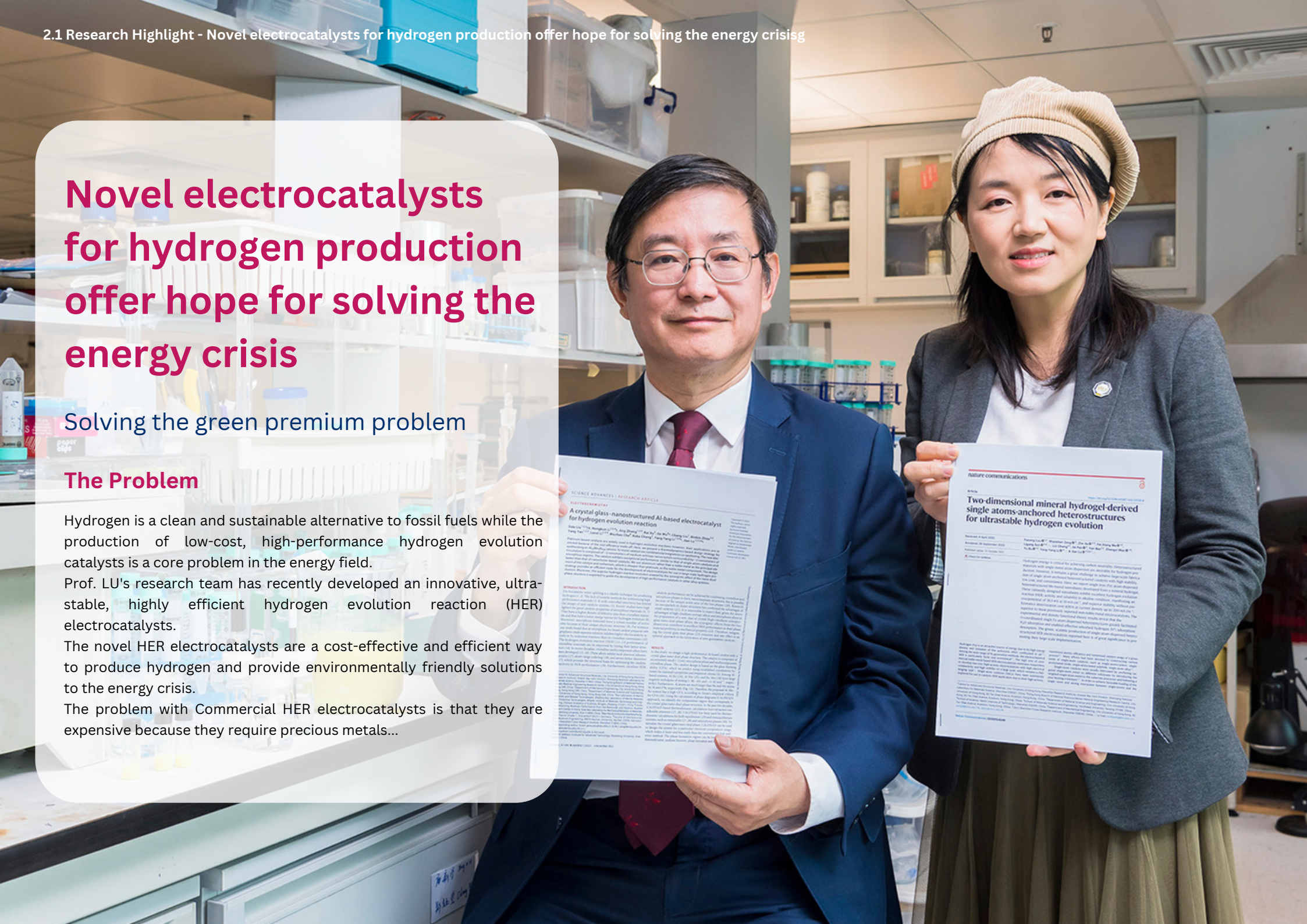
The Problem

Hydrogen is a clean and sustainable alternative to fossil fuels while the production of low-cost, high-performance hydrogen evolution catalysts is a core problem in the energy field.

Prof. LU's research team has recently developed an innovative, ultra-stable, highly efficient hydrogen evolution reaction (HER) electrocatalysts.

The novel HER electrocatalysts are a cost-effective and efficient way to produce hydrogen and provide environmentally friendly solutions to the energy crisis.

The problem with Commercial HER electrocatalysts is that they are expensive because they require precious metals...



The Impact

...A promising type of HER electrocatalysts intensively studied by scientists is single-atom catalysts for their potential in catalytic HER applications because of their high activity, maximised atomic efficiency, and minimised catalyst usage. However, the fabrication of single-atom catalysts is generally complicated, and requires a lot of energy and time.

The new electrocatalysts is based on two-dimensional mineral gel nanosheets and does not contain any precious metals. It can be produced on a large scale and help achieve a lower hydrogen price in the future. The research found that the new catalyst exhibits excellent electrocatalytic activity, long-term durability and ultra-stability.

The findings were published in *Nature Communications* under the title "Two-dimensional mineral hydrogel-derived single atoms-anchored heterostructures for ultrastable hydrogen evolution". **(READ MORE)**

Meet the team

Department of Mechanical Engineering, CityU:
Dr. LYU Fucong, Prof. LU Jian

Department of Material Science and Engineering, CityU:
Dr. LI Yangyang

Harbin Institute of Technology:
Dr. SUN Ligang

Read the full papers

nature communications

Article

https://doi.org/10.1038/s41467-022-33725-8

Two-dimensional mineral hydrogel-derived single atoms-anchored heterostructures for ultrastable hydrogen evolution

Received: 8 April 2022

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Check for updates

Fucong Lyu[1,2], Shanshan Zeng[3], Zhe Jia[2,4], Fei-Xiang Ma[1,2], Ligang Sun[5,6], Lizi Cheng[1,2], Jie Pan[3], Yan Bao[1,2], Zhengyi Mao[1,6], Yu Bu[1,2], Yang Yang Li[3] & Jian Lu[1,2,6,7]

Hydrogen energy is critical for achieving carbon neutrality. Heterostructured materials with single metal-atom dispersion are desirable for hydrogen production. However, it remains a great challenge to achieve large-scale fabrication of single atom-anchored heterostructured catalysts with high stability, low cost, and convenience. Here, we report single iron (Fe) atom-dispersed heterostructured Mo-based nanosheets developed from a mineral hydrogel. These rationally designed nanosheets exhibit excellent hydrogen evolution reaction (HER) activity and reliability in alkaline condition, manifesting an overpotential of 38.5 mV at 10 mA cm^{-2}, and superior stability without performance deterioration over 600 h at current density up to 200 mA cm^{-2}, superior to most previously reported non-noble-metal electrocatalysts. The

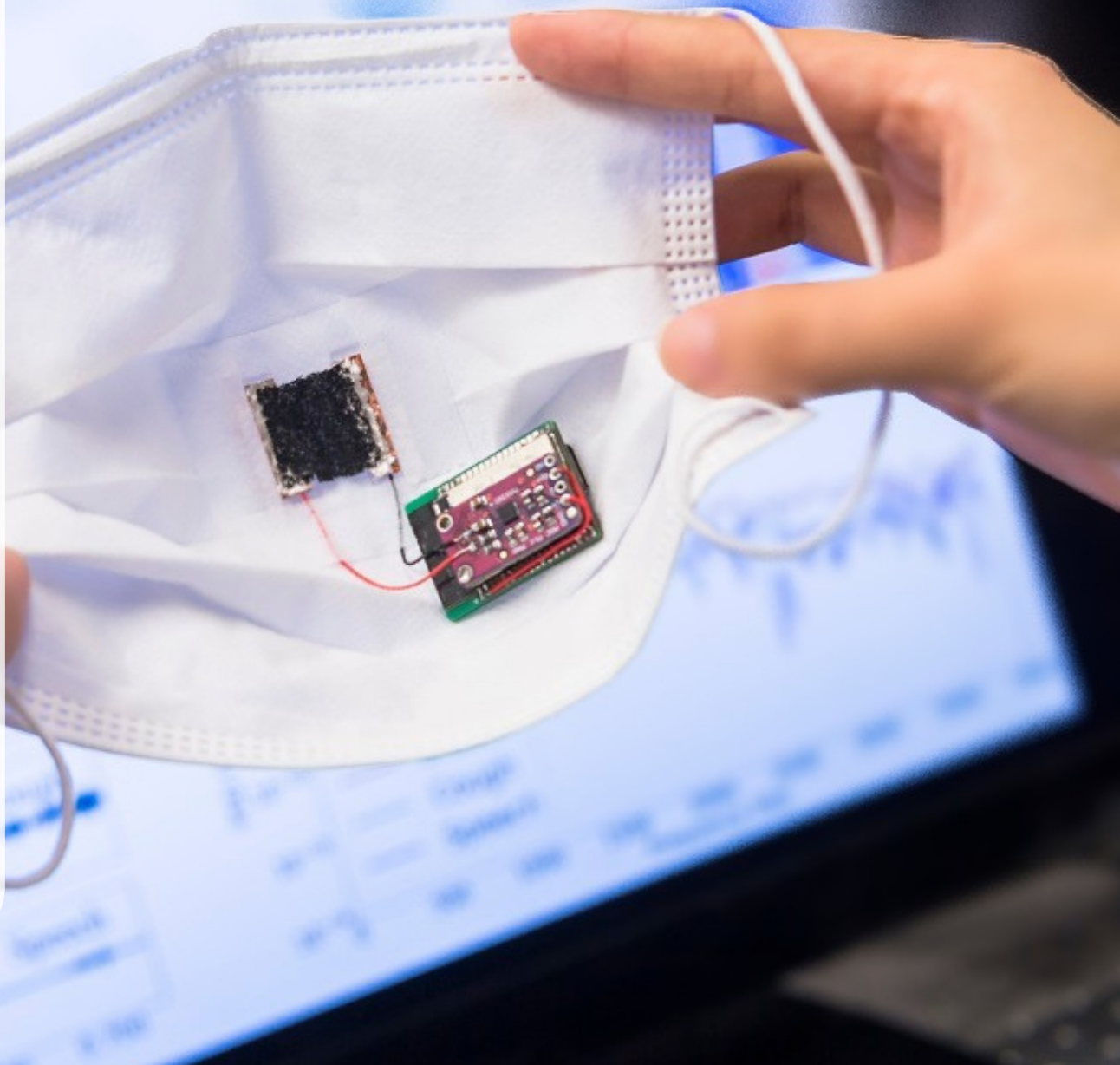
Smart mask to track respiratory sounds for respiratory disease identification

Early detection saves life

The Vision

Wearing face masks has been recognised as one of the most effective ways to prevent the spread of COVID-19, even in its coming endemic phase. Apart from the conventional function of masks, the potential for smart masks to monitor human physiological signals is being increasingly explored. Prof. LI Wen Jung's research team recently invented a smart mask that integrates an ultrathin nanocomposite sponge structure-based soundwave sensor, which can detect respiratory sounds of breathing, coughing and speaking.

Using machine-learning algorithms and a high sensitivity soundwave sensor operable across a wide bandwidth, the smart mask has opened new avenues for its application in the identification of respiratory diseases, as well as a voice interaction tool. This ultra-lightweight wearable technology also has the potential to improve personal and public health by enabling prolonged and systematic respiratory health monitoring in daily life.



The Impact

The team aims to eventually develop real-time diagnostics algorithms for applications such as pneumoconiosis symptom assessment. “As a potentially low-cost, daily smart wearable device, this new IoT smart mask will help personal and public health management of respiratory disease screening and diagnosis, especially in cities with a dense population, like Hong Kong,” said Dr. YU. The speech-detection ability of the smart mask can also help resolve the sound attenuation problem caused by wearing masks. The findings were published in *Advanced Science* under the title “Wide-Bandwidth Nanocomposite-Sensor Integrated Smart Mask for Tracking Multiphase Respiratory Activities”. **(READ MORE)**

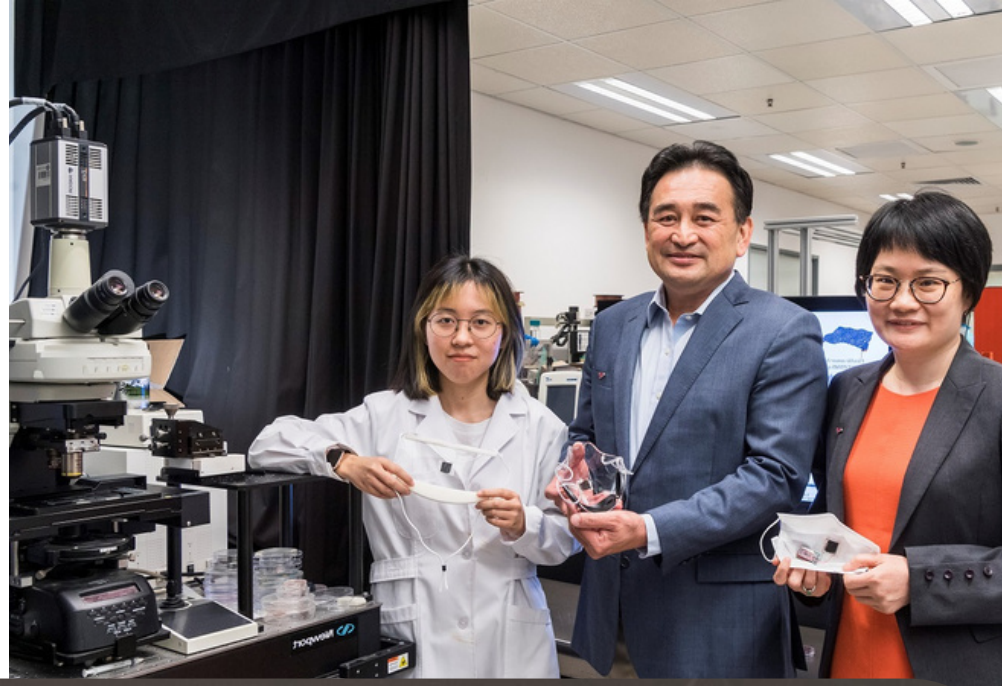
Meet the team

Department of Mechanical Engineering, CityU:
Prof. LI Wen Jung (MNE Chair Professor), SUO Jiao (MNE PhD student)

Department of Computer Science, CityU:
Prof. WANG Jian ping (CS Professor)

Department of Biomedical Engineering, CityU:
Dr. YU Xinge (BME Associate Professor)

School of Chinese Medicine, University of Hong Kong:
Prof. SHEN Jiangang



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RESEARCH ARTICLE

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Wide-Bandwidth Nanocomposite-Sensor Integrated Smart Mask for Tracking Multiphase Respiratory Activities

Jiao Suo, Yifan Liu, Cong Wu, Meng Chen, Qingyun Huang, Yiming Liu, Kuanming Yao, Yangbin Chen, Qiqi Pan, Xiaoyu Chang, Alice Yeuk Lan Leung, Ho-yin Chan, Guanglie Zhang, Zhengbao Yang, Walid Daoud, Xinyue Li, Vellaisamy A. L. Roy, Jiangang Shen, Xinge Yu,* Jianping Wang,* and Wen Jung Li**

Wearing masks has been a recommended protective measure due to the risks of coronavirus disease 2019 (COVID-19) even in its coming endemic phase. Therefore, deploying a “smart mask” to monitor human physiological signals is highly beneficial for personal and public health. This work presents a smart mask integrating an ultrathin nanocomposite sponge structure-based soundwave sensor (≈400 µm), which allows the high sensitivity in a wide-bandwidth dynamic pressure range, i.e., capable of detecting various respiratory sounds of breathing, speaking, and coughing. Thirty-one subjects test the smart mask in recording their respiratory activities. Machine/deep learning methods, i.e., support vector machine and convolutional neural networks, are used to recognize these activities, which show average macro-recalls of ≈95% in both individual and generalized models. With rich high-frequency (≈4000 Hz) information recorded, the two-/tri-phase coughs can be mapped while speaking words can be identified, demonstrating that the smart mask can be applicable as a daily wearable Internet of Things (IoT) device for respiratory disease identification, voice interaction tool, etc. in the future. This work bridges the technological gap between ultra-lightweight but

1. Introduction

Since the emergence of the coronavirus disease 2019 (COVID-19),[1] it has been generally accepted that universal masking is a necessary measure against the worldwide spread of COVID-19 because wearing masks can effectively prevent the transmission of coronavirus and influenza viruses from infected individuals.[2–5] Many countries established laws requiring the use of masks,[6,7] and wearing masks has become a daily necessity, including as a part of people’s social lives. Across the globe, there was a sentiment in early 2022 that the COVID-19 virus could soon become endemic, similar to common cold flu viruses. However, as warned by A. Katzourakis of Oxford University recently,[8] we must set aside optimism and be more realistic about the likely levels of death, disability, and illness that

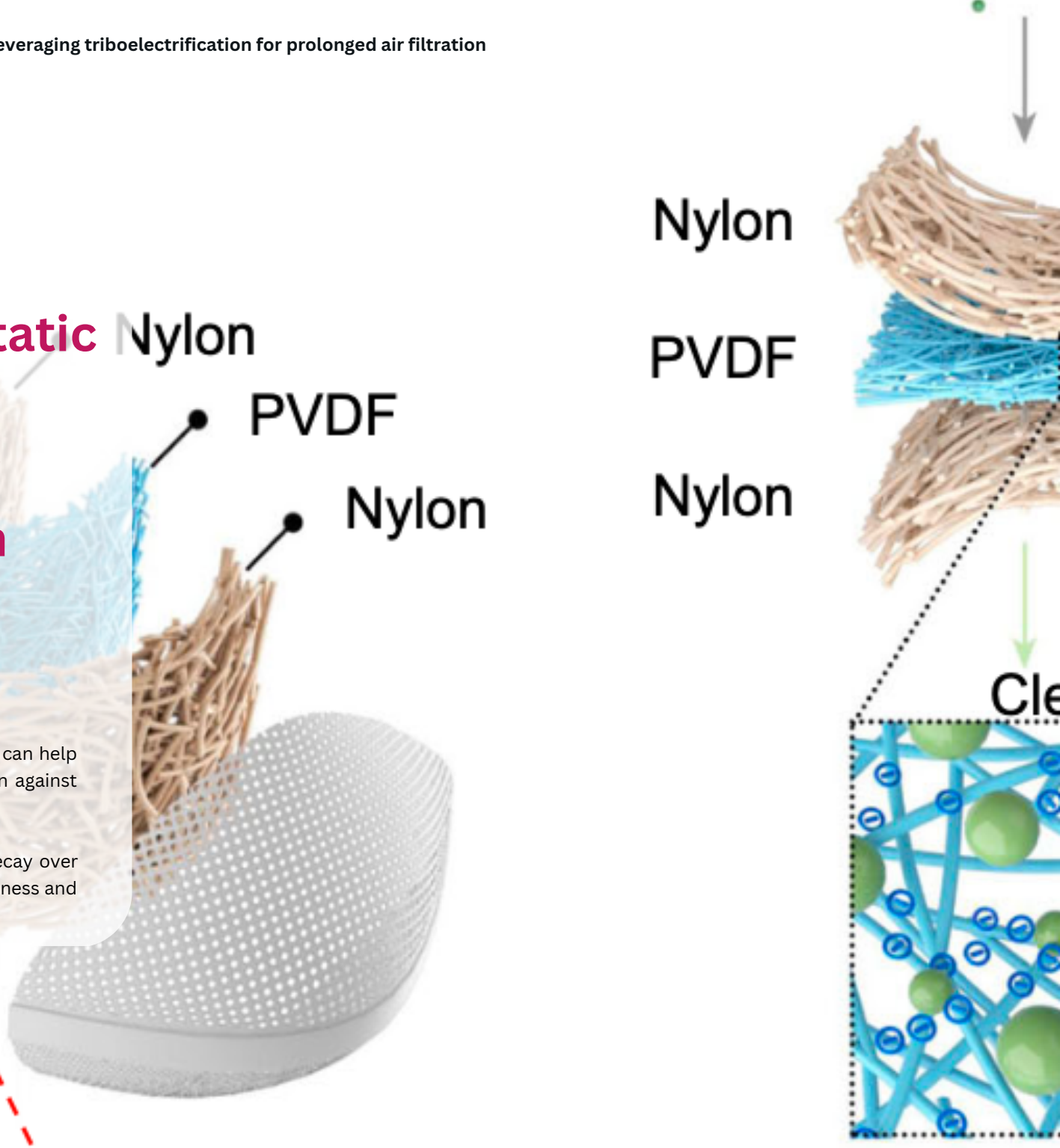
Self-charging electrostatic face masks leveraging triboelectrification for prolonged air filtration

Breaking the 4-hour barrier

The Problem

Electrostatic charge is vital for face masks (filters) because it can help to trap and filter tiny particles and provide better protection against respiratory issues.

However, the electrostatic charge of these filters tends to decay over time, particularly in humid conditions. This limits the effectiveness and lifespan of these filters.



The Solution

A self-charging air filter has been developed that captures airborne particles efficiently and for an extended period. The filter uses the triboelectric effect between an electrospun film of poly(vinylidene fluoride) nanofibers and nylon fabric to continuously replenish its electrostatic charge as the mask is worn and breathed through.

As a result of this breakthrough, the filter has an effective lifespan of up to 60 hours, including 30 hours of wear, and a minimum filtration efficiency of 95.8% for 0.3-micrometer particles. This is significantly higher than a commercial surgical mask's filtration efficiency and lifespan. The researchers also discovered a quantitative relationship between filtration efficiency and surface electrostatic potential, which could be used to extend the electrostatic adsorption efficacy of high-performance air-filtering masks significantly. **(READ MORE)**

Meet the team

Department of Mechanical Engineering, CityU:
PENG Zehua, Dr. YANG Zhengbao, HONG Ying, LI Xuemu, ZHANG Weiwei, Prof. WANG Zuankai, Prof. LI Wen jung, Prof. Michael K. H. Leung

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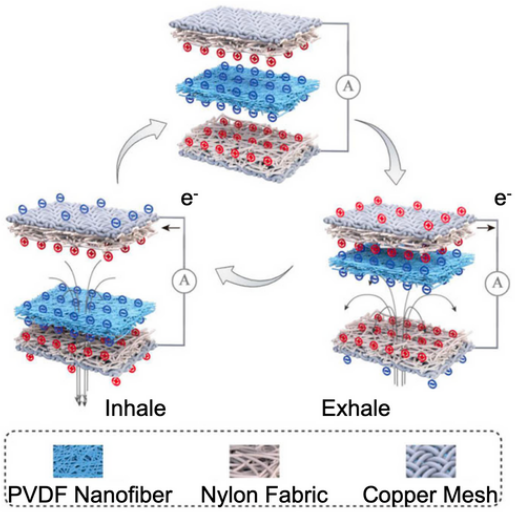
Department of Bioengineering, University of California, Los Angeles :
XIAO Xiao, CHEN Jun

College of Chemistry and Materials Science, Northwest University:
CHENG Yongliang

Department of Mechanical Engineering, The Hong Kong Polytechnic University:
Prof. WANG Zuankai

Shenzhen Research Institute, CityU:
Dr. YANG Zhengbao



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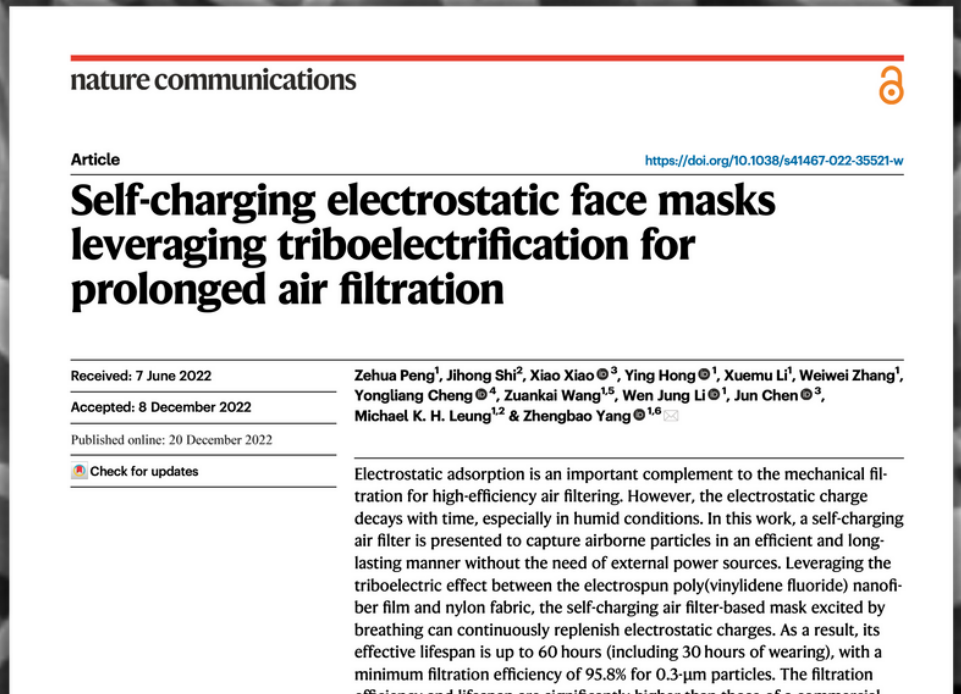

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Self-charging electrostatic face masks leveraging triboelectrification for prolonged air filtration

Received: 7 June 2022

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Check for updates

Zehua Peng[1], Jihong Shi[2], Xiao Xiao[3], Ying Hong[1], Xuemu Li[1], Weiwei Zhang[1], Yongliang Cheng[4], Zuankai Wang[1,5], Wen Jung Li[1], Jun Chen[3], Michael K. H. Leung[1,2] & Zhengbao Yang[1,6]

Electrostatic adsorption is an important complement to the mechanical filtration for high-efficiency air filtering. However, the electrostatic charge decays with time, especially in humid conditions. In this work, a self-charging air filter is presented to capture airborne particles in an efficient and long-lasting manner without the need of external power sources. Leveraging the triboelectric effect between the electrospun poly(vinylidene fluoride) nanofiber film and nylon fabric, the self-charging air filter-based mask excited by breathing can continuously replenish electrostatic charges. As a result, its effective lifespan is up to 60 hours (including 30 hours of wearing), with a minimum filtration efficiency of 95.8% for 0.3-μm particles. The filtration

Achieving thermally stable nanoparticles in chemically complex alloys via controllable sluggish lattice diffusion

Nanoparticle strengthening

The Problem

Nanoparticle strengthening is an important technique for improving the properties of materials and enabling the development of advanced materials with enhanced performance and functionality. However, the treated material tends to process poor thermal stability—limiting its use for certain applications.

The Solution

Here the research team has developed a strategy to achieve ultra-stable nanoparticles at 800~1000 °C (In a Ni59.9-xCoxFe13- Cr15Al6Ti6B0.1 (at.%) chemically complex alloy) by applying experimental techniques and theoretical simulations to understand the mystery of 'sluggish lattice diffusion (SLD) effect' in chemically complex alloys (CCAs) - which is known to endows remarkable thermal stability in CCA uncontrollably, the team found the key to achieve controllable SLD in CCAs, leading thermally stable nanoparticles strengthen material possible.

(READ MORE)

Meet the team

City University of Hong Kong:
Prof. CT LIU (University Distinguished Professor, Senior Fellow)

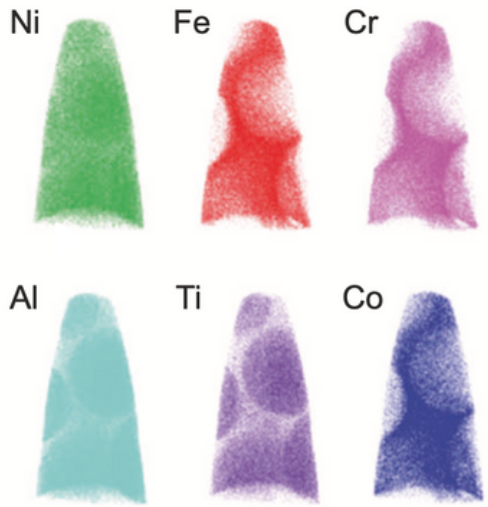
Department of Mechanical Engineering, CityU:
XIAO Bo, Dr. ZHAO Shijun, Prof. KAI Ji-Jung

Hong Kong Institute for Advanced Study, CityU:
XIAO Bo

Central South University, Changsha:
ZHANG Lijun, CHEN Shiyao

School of Materials Science and Engineering, Harbin Institute of Technology:
ZHAO Yilu

School of Materials Science and Engineering, Tianjin University:
XU Lianyong



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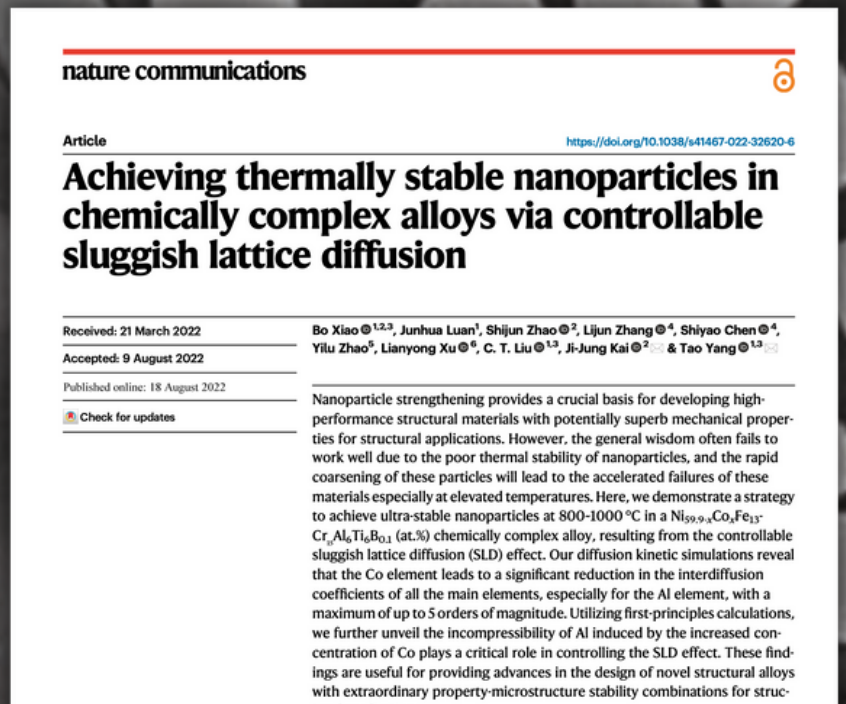

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Article

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Achieving thermally stable nanoparticles in chemically complex alloys via controllable sluggish lattice diffusion

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Check for updates

Bo Xiao[1,2,3], Junhua Luan[1], Shijun Zhao[2], Lijun Zhang[4], Shiyao Chen[4], Yilu Zhao[5], Lianyong Xu[6], C. T. Liu[1,3], Ji-Jung Kai[2] & Tao Yang[1,3]

Nanoparticle strengthening provides a crucial basis for developing high-performance structural materials with potentially superb mechanical properties for structural applications. However, the general wisdom often fails to work well due to the poor thermal stability of nanoparticles, and the rapid coarsening of these particles will lead to the accelerated failures of these materials especially at elevated temperatures. Here, we demonstrate a strategy to achieve ultra-stable nanoparticles at 800-1000 °C in a $Ni_{59.9-x}Co_xFe_{13}$-$Cr_{15}Al_6Ti_6B_{0.1}$ (at.%) chemically complex alloy, resulting from the controllable sluggish lattice diffusion (SLD) effect. Our diffusion kinetic simulations reveal that the Co element leads to a significant reduction in the interdiffusion coefficients of all the main elements, especially for the Al element, with a maximum of up to 5 orders of magnitude. Utilizing first-principles calculations, we further unveil the incompressibility of Al induced by the increased concentration of Co plays a critical role in controlling the SLD effect. These findings are useful for providing advances in the design of novel structural alloys with extraordinary property-microstructure stability combinations for struc-

Whisk-Inspired Motion Converter for Ocean Wave Energy Harvesting

An abundant source of renewable energy

The Promise

There is no such thing as a perpetual energy machine, but the ocean might be the closest we have got so far. With an estimated two terawatts per year, ocean wave energy is something we don't want to miss out on. Up to now, it has been an abundant source of renewable energy.

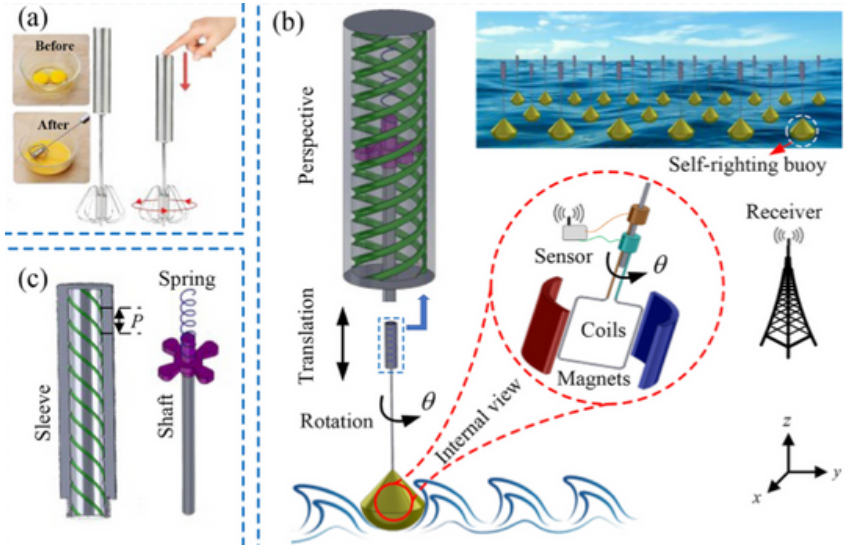
Over the years, there have been numerous attempts at different wave energy capture designs. And so, the Department of Mechanical Engineering has also attempted to contribute to this promising field. Led by Associate Professor Dr YANG Zhengbao,...

The Solution

...A research team has developed a low-cost wave energy conversion device. The mechanism was inspired by the hand-push whisk blenders widely used in the kitchen. It converts translational motion into high-speed rotation motion and generates electricity via electromagnetic effect. The proposed design is low-cost, with ultralow operation frequency (lower than 1 Hz) and high-power output. Water tests indicate that the normalized power density is 300% higher than state-of-the-art. **(READ MORE)**

Meet the team

Department of Mechanical Engineering, CityU:
PAN Qiqi, Dr. YANG Zhengbao, WANG Biao, ZHANG Lingling, LI Zhongjie



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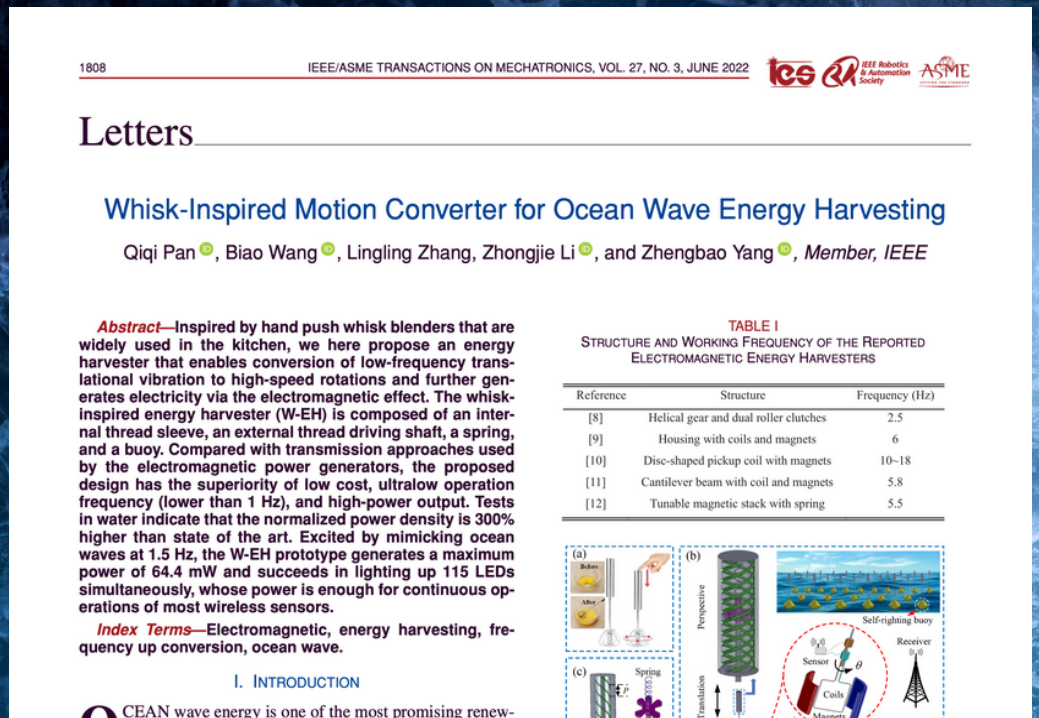

1808 IEEE/ASME TRANSACTIONS ON MECHATRONICS, VOL. 27, NO. 3, JUNE 2022

Letters

Whisk-Inspired Motion Converter for Ocean Wave Energy Harvesting

Qiqi Pan, Biao Wang, Lingling Zhang, Zhongjie Li, and Zhengbao Yang, *Member, IEEE*

Abstract—Inspired by hand push whisk blenders that are widely used in the kitchen, we here propose an energy harvester that enables conversion of low-frequency translational vibration to high-speed rotations and further generates electricity via the electromagnetic effect. The whisk-inspired energy harvester (W-EH) is composed of an internal thread sleeve, an external thread driving shaft, a spring, and a buoy. Compared with transmission approaches used by the electromagnetic power generators, the proposed design has the superiority of low cost, ultralow operation frequency (lower than 1 Hz), and high-power output. Tests in water indicate that the normalized power density is 300% higher than state of the art. Excited by mimicking ocean waves at 1.5 Hz, the W-EH prototype generates a maximum power of 64.4 mW and succeeds in lighting up 115 LEDs simultaneously, whose power is enough for continuous operations of most wireless sensors.

Index Terms—Electromagnetic, energy harvesting, frequency up conversion, ocean wave.

I. Introduction

TABLE I
Structure and Working Frequency of the Reported Electromagnetic Energy Harvesters

Reference	Structure	Frequency (Hz)
[8]	Helical gear and dual roller clutches	2.5
[9]	Housing with coils and magnets	6
[10]	Disc-shaped pickup coil with magnets	10~18
[11]	Cantilever beam with coil and magnets	5.8
[12]	Tunable magnetic stack with spring	5.5

3

Student Stories

Q & A

Mr. Vojin LUKIC
(MNE Outstanding Student)

By

MNE Department

Mr. Vojin LUKIC

BEng (Hons) Mechanical Engineering student

CityU International Scholarship

College of Engineering Dean's Scholarship

MNE Student of the Year

MNE Outstanding Student

Diversity Grant

> Coming to CityU was a 180-degree, life-changing experience and one of the best decisions of my life.

Vojin is our third year BEng Mechanical Engineering student who has consistently excelled in his academic pursuits and extracurricular activities. With a strong work ethic and a dedication to continuous learning, Vojin has consistently been recognized for his outstanding achievements.

One of the keys to Vojin's achievements can be attributed to his "ASK" approach to life - attitude, skills, and knowledge. Vojin believes that having a positive attitude, honing a diverse set of skills, and continually seeking out new knowledge are the keys to personal and professional growth.

This approach has served him well, as he has received multiple awards and accolades for his academic achievements, leadership skills, and community service. Whether he is leading a group project in the classroom or organizing events for the university, Vojin approaches every challenge with enthusiasm and determination.

Through his hard work and dedication, Vojin has not only succeeded in his studies, but has also made a meaningful impact on his community. We sat down with Vojin to learn more about his journey and how his ASK mindset has helped him achieve his goals.

MNE: Can you tell us what made you come to Hong Kong to complete your BEng in Mechanical Engineering at CityU?

VL: I strongly believe that opening yourself up to new experiences, cultures, and perspectives can broaden your reasoning and views, and ultimately help you enhance your problem-solving, creative output, and world outlook. This stands at the heart of my decision to come to Hong Kong and study in CityU. As for choosing BEng in Mechanical Engineering, it is my sole passion and dedication to work in this field. I cannot see myself in any other field than this. I realised this very early and firmly set my mind to explore and enjoy the subject further.

MNE: How has your experience in the MNE Department been so far?

VL: Coming into CityU, the whole world was struggling with the threat of COVID-19, which forced our classes to move online. Naturally, it is very hard to teach engineering courses without hands-on experience, but the MNE Department has been very diligent and responsible in providing students all of the materials needed to continue their studies as normal, including me.

I feel that the MNE Department is structured very well to suit my needs. The courses offer comprehensive insight into a wide variety of topics, but give you enough room to really focus on what you find most interesting. The professors are always very responsive to my opinions and discussions, in which I frequently engage. I feel welcome in their offices whenever I go, whether that is to quickly resolve an issue or ask for advice related to my career choices in general.

This summer, I worked as a Mechanical Engineering Intern in a successful company started by CityU Alumni majoring in Mechatronics as a product of CityU's HK Tech 300 initiative. My job included developing a robot prototype, calculating volumetric flow rates, and modelling complex surfaces to mount additional structures. I grew not only as an engineer but also as a communicator and member of a prolific team.

I feel supported by my department and really look forward to the future opportunities it can offer me to successfully develop my career.

MNE: We notice that you have been awarded a number of scholarships. Can you tell us more about that?

VL: First, I have received both the Full Tuition Scholarship and Diversity Grant for every academic year. The first one is awarded to students who show great academic potential, whereas the second nurtures the diversification of the university and encourages the presence of a wide variety of cultures, for which I am very grateful.

Second, I was awarded two awards at the end of my second year – the MNE Outstanding Student Award and the MNE Student of the Year Award. These awards recognised the hard work and dedication I put into my studies.

Third, which is the one I am most proud of, is the College of Engineering Dean's Scholarship.

... I was selected for this scholarship based on a number of factors, including academic performance, participation in extracurricular activities, general knowledge of society, and presentation skills and analytical thinking. The selection process was tense, with two rounds of interviews with staff from CityU. In the end, I managed to stand out as one of the best candidates in the competitive environment of the College of Engineering.

All of these scholarships really motivated me to stop worrying and to focus and make the most out of the opportunities the university has given me.

MNE: Can you share with us some of the challenges you have overcome to obtain those awards?

VL: I had to develop my strong work ethic long before coming to CityU. I feel like I did this during my high school years, as these involved me moving from my home to another city at the age of 14, long hours of studying into the night, and a lot of compromises. This made me really experienced in adapting to different circumstances. Coming to Hong Kong after high school, all the way from Europe, was much easier – I was already familiar with this environment of change and adaptation, and getting used to a new country, working culture, and relationships was something I had already mastered. I still face a number of challenges every day, but I have learnt how to deal with and overcome them.

Moreover, as with any other student, I carry a lot of anxiety with me – about my future, my work, my relationships – especially because I come from a small town in central Serbia of only 20,000 people. Every time I step into an MTR station on a Sunday, I realise how huge Hong Kong actually is, and how hard it is for an individual and their needs to stand out in a colossal society such as this one.

However, what helps me is the focus and shear will that I have. I have roughly defined the path that I am to take, and I have made sure to firmly stick to it during my time here in Hong Kong. I think this has made a great deal of difference in how I carry myself with challenges and how I overcome them.

MNE: What is your plan after graduating?

VL: As I mentioned, my path in life is flexible up to a certain point, but I have defined the areas in engineering that I want to pursue and work in. My choices are usually industry oriented and that is where I plan to end up. I think it is extremely important for me to visualise the products of my work and how I can actively make a net positive difference in the world and make people's lives easier, because that is effectively the job of an engineer. I also think that the decisions I am making and will make in the future will put me in a place outside of my comfort zone. This is where I challenge myself and actually achieve the personal and intellectual growth that I aim for.

...So I definitely intend to end up in a position in the industry that pushes me to my limits and where the results of my work can quickly be implemented and returned with feedback. When I think of some of my most desired roles, Formula 1 engineer immediately comes up into my mind. It is fast paced, highly demanding, challenging, and exceptionally rewarding. It is the peak of mechanical engineering and involves an aspect that attracts me even more – competition.

All in all, my work needs to be on a topic that I am interested in, even if it means sacrificing potential financial gains.

'Think deeply about your career goal and do not step into one for superficial reasons.'

> **Ultimately, I wish all future students the best in their studies here in CityU.**

MNE: **Do you have any advice for our future students?**

VL: As I mentioned, what helped me – and what I think will help many people – is having a clear definition of the path they intend to take in life. It can help you focus and deal with many problems. Think deeply about it and do not step into a career for superficial reasons. If more people put care into what they do, we as a society would become more satisfied and happier and, as a result, our society will advance.

Furthermore, for the students in my department, I really think they should engage beyond the coursework and pursue interests through extracurricular activities, websites, and student societies, have discussions with friends, challenge the modern mechanical engineering world, keep a record of their thoughts, and strive to keep up with the technology. Whatever it is, do more than the minimum of what the university offers. This is how you will stand out.

However, do not be discouraged if things do not go your way, and try to utilise every opportunity you get. You cannot plan out your whole life down to every single detail, but what you can do is make the most out of the present and move forward. I once thought I could only study in Europe, but coming to CityU was a 180-degree, life-changing experience and one of the best decisions of my life.

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News & Notable

HK Tech300 Start-up founded by MNE students has been awarded a seed fund

Dr. LI Weihong (MNE Assistant Professor) - Sunlite Limited

> **It's an important step for us to proceed the commercialization of the window**

Full-spectrum solar harvesting window for green buildings saves 62% of annual heating, ventilation, and air-conditioning (HVAC) energy consumption in Hong Kong.

Sunlite Limited – co-founded by our department researchers Mr KO Hiu Chi (undergraduate student), Mr ZENG Yijun (PhD student), Dr LIU Ying (postdoctoral researcher), and Dr. LI Weihong (Assistant Professor) – was awarded the HK Tech 300 seed fund in the seventh cohort.

HVAC accounts for a substantial portion of global energy consumption, with the percentage being 68% in Hong Kong. The company aims to help abate carbon emissions from buildings by designing a solar harvesting window for full-spectrum solar energy harvesting that can turn a passive window into an active photovoltaic-thermal energy collecting system. 'We developed two branches of materials that convert ultraviolet and near-infrared light into electricity and thermal energy. These materials can be solution-processed and are ready to be large-scale manufactured. We expect that the window will open up a new avenue for energy-efficient buildings', said Mr KO Hiu Chi (co-founder.

HK Tech300 Start-up founded by MNE students has been awarded an angel fund of 1 million HKD

Dr. Steven WANG (MNE Assistant Professor) - SBC Technology

> **This highly efficient, low-cost filtering system with simple installation can provide sufficient protection for healthcare workers.**

Founded by MNE students with Dr. Steven WANG (MNE Assistant Professor) as the group advisor, SBC Technology (formerly, Soteria) is notable for having innovated a portable negative-pressure ventilation system at the height of the COVID-19 pandemic. The system effectively protects healthcare workers in hospital wards during COVID-19 surges by reducing aerosol transmission.

With its experience in developing practical solutions during challenging times, the group now focuses on ventilation systems and anti-viral membrane materials for other high-risk places, particularly airports, to help minimise the risk of airborne cross-infection.

MNE PhD Students won Grand Prize

The 8th Hong Kong University Student Innovation and Entrepreneurship Competition cum National University Student Innovation and Entrepreneurship Competitions (HKSAR) Awards Ceremony

MNE research students won the First Prize and Grand Prize in the 8th Hong Kong University Student Innovation and Entrepreneurship Competition cum National University Student Innovation and Entrepreneurship Competitions (HKSAR) Awards Ceremony.

A total of HKD60,000 in cash prizes was awarded to the research team (HKD10,000 for the First Prize in Mathematics and Physics/Mechanics and Control Systems and HKD50,000 for the Grand Prize in Innovation).

The award-winning research project was ‘Structured Thermal Armour’, which was published in Nature earlier this year under the title, ‘Inhibiting the Leidenfrost effect above 1,000 °C for sustained thermal cooling’.

The team was supervised by Prof. Wang Zuankai and Dr. JIANG Mengnan (the postdoctoral researcher of Prof. WANG Zuankai). The team members included Mr Liu Fayu, Mr LI Mingyu, Mr LI Yuchao, and Mr ZENG Yijun.

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