



澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU



應用物理及材料工程研究院
INSTITUTO DE FÍSICA APLICADA E ENGENHARIA DE MATERIAIS
INSTITUTE OF APPLIED PHYSICS AND MATERIALS ENGINEERING

IAPME Newsletter

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❖ Publications (IF $\geq$ 10; *corresponding author)

1. **Sen Ding**, Ziyi Dai, Dazhe Zhao, Xiao Guan, Yue Quan, Mingrui Wang, Yinning Zhou, Junwen Zhong, and **Bingpu Zhou***. Self-elevated 3D Helical Oscillator with Addressable Eigenfrequency for Wearable Interface. *Advanced Materials*, 2516218 (2025). DOI: 10.1002/adma.202516218.
[2024 IF=26.8]

RESEARCH ARTICLE

**ADVANCED
MATERIALS**
www.advmat.de

Self-Elevated 3D Helical Oscillator with Addressable Eigenfrequency for Wearable Interface

Sen Ding, Ziyi Dai, Dazhe Zhao, Xiao Guan, Yue Quan, Mingrui Wang, Yinning Zhou, Junwen Zhong, and Bingpu Zhou*

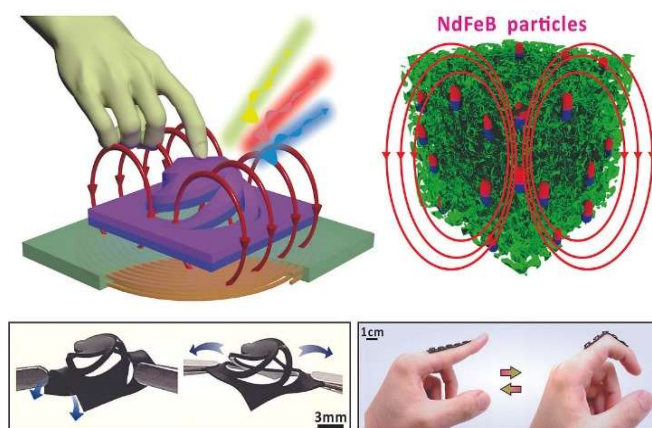
❖ Research Stories

UM research team developed self-elevated 3D helical oscillator with addressable Eigenfrequency for wearable interface

- Equipped with three-dimensional architecture, flexible electronic devices enable intuitive tactile sensing with enhanced spatial efficiency and skin conformity.
- In this study, we show that a 3D self-elevated helical oscillating unit (SEHOU) on flexible films can be spontaneously formed leveraging magnetic repulsion among ferromagnetic microstructures. Through specific pattern design, the 3D morphology was precisely tuned upon built-in magnetic moments that balance with the inherent elastic strength.
- With electromagnetic induction, axial vibrations of SEHOU generate sinusoidal electric signals with intrinsic oscillating frequency. Along with the theoretical model, non-overlapping eigenfrequencies were customized, allowing convenient mapping of mechanical inputs from the received electrical signals. Crosstalk-free interactions can be achieved on a single piece of SEHOU-based wearable interface, e.g. multi-touch recognition, without compromising the overall wearability.



(From left) Dr. Sen Ding (丁森), Dr. Ziyi Dai (戴子憶) and Prof. Bingpu Zhou (周冰朴)



Schematic diagram of signal generation process of a SEHOU-based interface and the composition of SEHOU. (Top) Flexibility and wearability of single and five SEHOU. (Bottom)

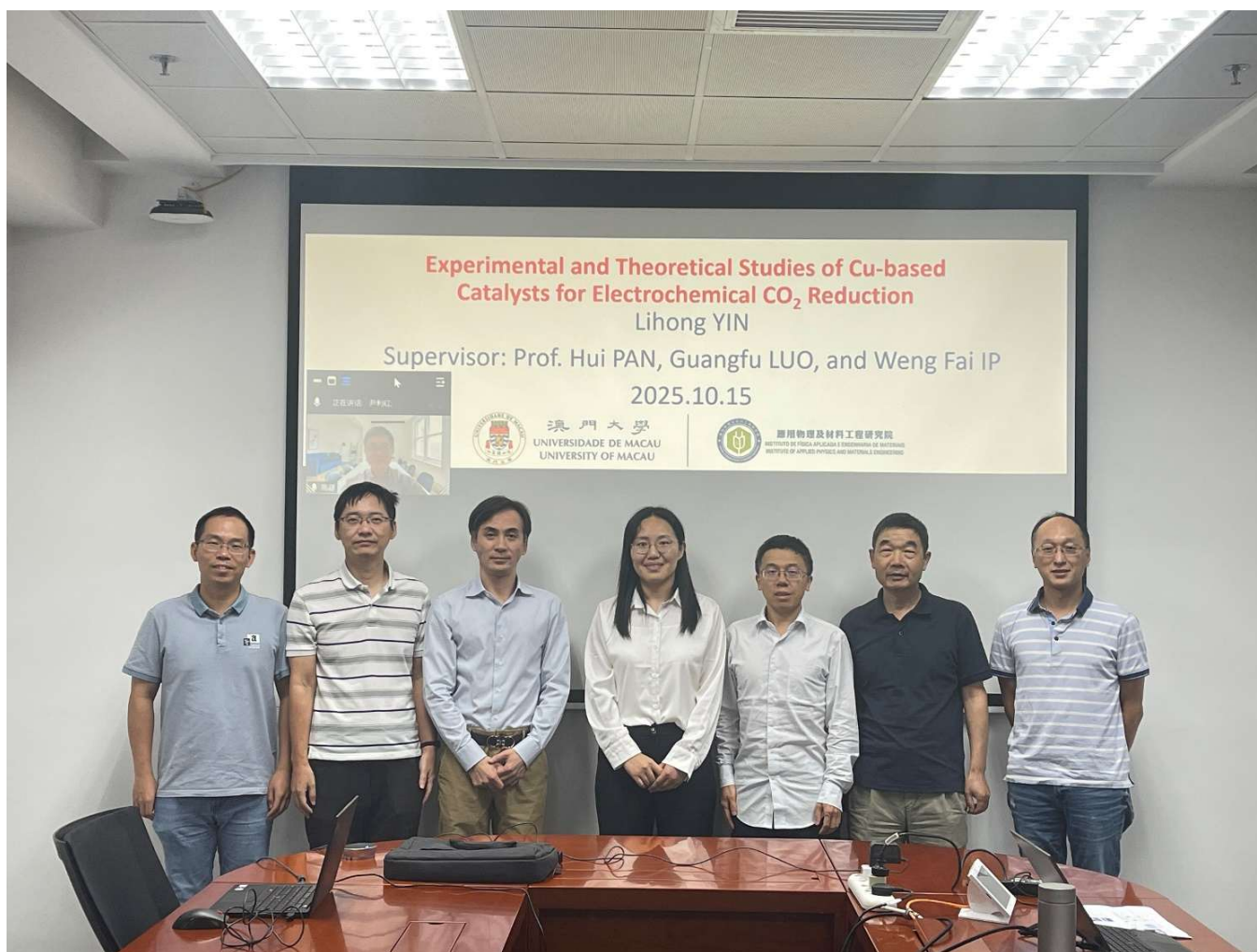
Sen Ding, Ziyi Dai, Dazhe Zhao, Xiao Guan, Yue Quan, Mingrui Wang, Yinning Zhou, Junwen Zhong, and **Bingpu Zhou***. Self-elevated 3D Helical Oscillator with Addressable Eigenfrequency for Wearable Interface. *Advanced Materials*, 2516218 (2025). DOI: 10.1002/adma.202516218. [2024 IF=26.8]

Prof. Bingpu Zhou is the corresponding author of this study. The first authors are Dr. Sen Ding and Dr. Ziyi Dai. This work was supported by the Science and Technology Development Fund, Macao SAR (File no. 0057/2023/RIB2), Macao Centre for Research and Development in Advanced Materials (grant no. 0002/2024/TFP), National Natural Science Foundation of China (grant no. 62401343), and University of Macau (grant no. MYRG2024-00090-IAPME).

❖ Ph.D. Student Thesis Oral Defenses

Lihong Yin of Prof. Hui Pan, Prof. Guangfu Luo and Prof. Weng Fai Ip's group presented "Experimental and Theoretical Studies of Cu-based Catalysts for Electrochemical CO₂ Reduction" in her oral defense on October 15, 2025.

Congratulations to Dr. Lihong Yin!



(from left) Prof. Hongchao Liu (劉宏超), Prof. Shi Chen (陳石),
Prof. Hui Pan (潘暉), Dr. Lihong Yin (尹利紅),
Prof. Guangfu Luo (羅光富, SUSTech), Prof. Handong Sun (孫漢東),
Prof. Weng Fai Ip (葉穎暉, FST) and Prof. Yi Gao (高巍, UCAS)

❖ New Column Wraps Installed at N23 Entrance to Highlight IAPME and CERT

In a recent enhancement to campus signage and institutional visibility, two stone columns at the entrance of the N23 Research Building have been newly outfitted with custom-designed column wraps. These wraps prominently feature the names and logos of our Institute and the Centre for Engineering Research and Testing (CERT).

The installation is part of ongoing efforts to improve directional guidance and strengthen the visual identity of research units within the university. The design blends modern aesthetics with clear institutional branding, offering a professional and easily recognizable representation of both units.

Now serving as a key visual element at the building's entrance, the column wraps contribute to a more navigable and cohesive campus environment.





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❖ The Joint Team of IAPME and FHS Won the 3-on-3 Basketball Competition

The “2025 UM Sports Fest,” jointly organized by the Office of Sports Affairs (OSA) and the UMSU Sports Association (UMSU SPA), continues to foster camaraderie and wellness among University of Macau staff through a variety of athletic events. Among the highlights was the 3-on-3 Basketball Competition (Staff Category), which drew enthusiastic participation from departments across campus.

On October 15, 2025, a joint team representing our Institute and the Faculty of Health Sciences (FHS) competed in the staff basketball event and emerged as champions. The team comprised Prof. Binmeng Chen (陳斌猛), Prof. Shen Lai (賴岫), Prof. Haomin Song (宋昊旻), Dr. Terran Tang (湯軼蕊), Mr. Alvin Su (蘇勁華) and Mr. Jimmy Chang (曾展宏, FHS), whose coordinated efforts and sportsmanship led them to victory.

Congratulations to the team on the outstanding achievement! The performance exemplifies the spirit of teamwork and excellence that the UM Sports Fest aims to promote.



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