

國立清華大學「微感測器與致動器產學聯盟」活動公告

• 時間：05/18/2023 (星期四) 下午 14:00-15:30

• 地點：國立清華大學動力機械工程學系 工程一館 108 室

● 宗旨

2013 年多位在微機電領域有豐富經驗的清大教授，於科技部的支持下成立「微感測器與致動器產學聯盟」(Micro Sensors and Actuators Technology Consortium, μ SAT)。多年來聯盟透過整合學研界的資源和經驗，協助業界解決技術問題、提供設備支援、及技轉和人才培育等，也陸續邀請數十位國內外微系統專家學者，舉辦專題演講。今年因為疫情趨緩，聯盟準備開始舉辦活動，促進國內產學研界的交流，歡迎參加。也歡迎國內微系統業者，踴躍加入本聯盟，一起努力提升我國技術水準與國際競爭力。

● 演講內容

Energy harvesting from human motion is suitable for powering battery-less wearable devices. In such applications, electret energy harvesters (EH) have advantages over other type of EHs due to the fact that low-frequency motion is dominant. In this talk, development of new electret materials based on quantum chemical analysis and machine learning are presented, and their application to rotational/stretchable electret EH are introduced.

In the last 90 years since the first development of electret using Carnauba wax, electret materials have been developed by heuristic approach. In the present study, for the first time, a novel high-performance amorphous fluorinated polymer electret based on quantum chemical analysis and machine learning is proposed. A new electret material based on CYTOP thus obtained offers a record-high surface charge density with extremely-high thermal stability of implanted charges. In addition, novel stretchable electret material based on amorphous fluorinated polymer is also discussed.

As an application of the developed CYTOP electret, a novel low-profile rotational electret EH is prototyped. Output power up to 1 mW has been obtained at a low rotational speed of 1 rps with only 3 mm in thickness. Evaluation of the rotational EH for human walking is also discussed.

● 講員簡介

Prof. Yuji Suzuki received the B.S., M.S., and Dr.Eng. degrees in mechanical engineering from the University of Tokyo, Tokyo, Japan, in 1987, 1989, and 1993, respectively. He is currently with the Department of Mechanical Engineering, the University of Tokyo, as a Professor. He received *IEEE Fellow*, *Fellow of Combustion Institute*, and *Fellow of JSME*. He serves as Steering Committee Member of PowerMEMS Conference, Organizing Committee member of IEEE International Symposium on Electret (ISE). He also served as **the general co-chair of IEEE MEMS 2010** (Hong Kong) and **the general chair of PowerMEMS 2017** (Kanazawa). His research interests include MEMS-based energy harvesting using electrets, micro energy conversion such as microscale combustion, and optimal design/control of micro heat and fluid flow.

時間	項目	講員
13:30-14:00	報到	
14:00-15:00	Machine-learning-based Design of Amorphous Polymer Electret for Vibration Energy Harvesting	Prof. Yuji Suzuki (Department of Mechanical Engineering, The University of Tokyo)
15:00-15:30	Tea Break and Networking	

- 參加對象：對微系統領域有興趣之業界及學研界人士
- 名額：由於座位有限，名額僅 100 人
請於 2023 年 5 月 16 日 前上網報名 <https://forms.gle/R6FGrvWfdX7paQtF9>
- 費用：一律免費
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主辦單位：國立清華大學「微感測器與致動器產學聯盟」(網址：<http://www.usat.org.tw/>)
SEMI Taiwan (網址：<http://www.semi.org/ch/>)

協辦單位：國立清華大學動機系、國立清華大學奈微所、國立清華大學工學院產學研合作聯盟