Lecture by Dr. Gábor Méhes (Waseda University, Japan)

IEE SAS invite you to a lecture by **Dr. Gábor Méhes** (*Waseda University, Japan*) on **8 October, 2025 at 9:30 a.m.** in the IEE SAS Meeting Room 101 at Dúbravská Cesta 9 in Bratislava.

**Dr. Gábor Méhes** is a Lecturer at Waseda University, Japan. He completed his PhD in 2014 in organic photonics and electronics in Kyushu University, Japan. Dr. Méhes has been engaged in research in **organic electronics, bioelectronics, microbial electrochemistry, photosynthetic energy harvesting, printed and flexible hyrid electronics** for over forteen years. Throughout his scientific career, he had the chance to engage in scientific endeavaors in several world-leading laboratories in Japan, Sweden and the United States. His lecture will include knowledge gained from his work experience from these laboratories.

***Title of the lecture:***

Advancements in the fields of organic electronics and bioelectronics through research in Japan, Sweden, and the US

***Abstract:***

Organic electronics is centered around pi-conjugated molecules with electrically conducting, semiconducting or light-absorbing/emitting properties. When made into high quality thin films organized into multilayered structures capped with electrode layers, these molecules can give life to electronic devices that can be flexible, stretchable, or emit bright colors. By reacting or associating with ionic species, organic electronic devices can even bridge the communication gap between electronic and biological domains, for example in the forms of organic electrochemical transistors (OECT) and organic electronic ion pumps (OEIP) used for biosensing and drug delivery, respectively.

In the first part of the talk, I will briefly introduce the field of organic electronics, along with my research experiences in small molecular thermally-activated delayed fluorescence (TADF) based organic light-emitting diodes (OLED) acquired at Kyushu University, located in southern Japan. From there, we will journey to Sweden, Linköping University, to my next research stage, to see how conducting polymers (and devices) can be integrated onto and into plants for a variety of purposes. This will be followed by a short (2 months) journey to northern California, Berkeley Lab, where I got insights into electroactive bacteria, their utilization for various microbial energy conversion technologies, and what organic electronics can offer to enhance the bacterial signal extraction. Heading back to Japan, this time to the northeastern region of Yamagata University, where I also spent over a year, we will make a detour to learn about a flexible hybrid SpO2 and heart rate monitoring printed flexible hybrid electronic (FHE) device. If time and interest allows, or during coffee discussions, we can dwell into some more works, especially those I engaged in since 2022, when I joined my current position Waseda University. Some of the works offered for discussion are wireless oral pathogen detection, redox polymer interfaces for bacteria, selfsterilizing face masks, ionic logic circuits, nanotube cell delivery system.

Selected references:

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2. [Influence of host matrix on thermally-activated delayed fluorescence: Effects on emission lifetime, photoluminescence quantum yield, and device performance](https://www.sciencedirect.com/science/article/pii/S1566119914002067?via%3Dihub), Organic Electronics: physics, materials, applications 15 ( 9 ) 2014,

<https://www.sciencedirect.com/science/article/pii/S1566119914002067?via%3Dihub>

1. [Solar Heat-Enhanced Energy Conversion in Devices Based on Photosynthetic Membranes and PEDOT:PSSNanocellulose Electrodes](https://onlinelibrary.wiley.com/doi/full/10.1002/adsu.201900100), Advanced Sustainable Systems 1900100 - 1900100 2020.01, <https://onlinelibrary.wiley.com/doi/full/10.1002/adsu.201900100>
2. [Real-Time Monitoring of Glucose Export from Isolated Chloroplasts Using an Organic Electrochemical Transistor](https://onlinelibrary.wiley.com/doi/pdf/10.1002/admt.201900262), Advanced Materials Technologies 5 ( 3 ) 2019.06, <https://onlinelibrary.wiley.com/doi/pdf/10.1002/admt.201900262>
3. [Single-walled Carbon Nanotubes Wrapped with Charged Polysaccharides Enhance Extracellular Electron Transfer](https://pubs.acs.org/doi/10.1021/acsabm.4c00749)., ACS Applied Bio Materials 2024.07, <https://pubs.acs.org/doi/10.1021/acsabm.4c00749>
4. [Organic Microbial Electrochemical Transistor Monitoring Extracellular Electron Transfer](https://onlinelibrary.wiley.com/doi/full/10.1002/advs.202000641), Advanced Science 7 ( 15 ) 2000641 - 2000641 2020.08, <https://onlinelibrary.wiley.com/doi/full/10.1002/advs.202000641>
5. [PEDOT:PSS-based Multilayer Bacterial-Composite Films for Bioelectronics](https://www.nature.com/articles/s41598-018-33521-9), Scientific Reports 8 ( 1 ) 2018.10, <https://www.nature.com/articles/s41598-018-33521-9>
6. [Blood Oxygen and Heart Rate Monitoring by A Flexible Hybrid Electronics Device Fabricated by Multilayer](https://onlinelibrary.wiley.com/doi/full/10.1002/aelm.202300615)

[Screen-Printing](https://onlinelibrary.wiley.com/doi/full/10.1002/aelm.202300615), Advanced Electronic Materials 2024.05, <https://onlinelibrary.wiley.com/doi/full/10.1002/aelm.202300615>