SensUs

3rd International Symposium on Continuous Real-Time Biomolecular Sensing

August 25, 2026

Levodopa Dynamics in Parkinson's Disease: From Patient Experience to Sensors for Real-Time Levodopa Monitoring

Den Dolech 2, 5612 AZ Eindhoven, Netherlands

Eindhoven University of Technology
Atlas Building & Online

Welcome

Welcome to the 3rd CRBS symposium, the international symposium on Continuous Real-time Biomolecular Sensing!

On behalf of the SensUs student competition and Eindhoven University of Technology, I warmly welcome you to this symposium, where we will explore and discuss recent developments in continuous biomolecular sensing and their potential to address pressing healthcare challenges.

The 1st CRBS Symposium in 2024 provided a broad overview of the technological concepts being explored worldwide to achieve continuous sensing of biomolecules at low concentrations.

The 2nd CRBS Symposium in 2025 took a deeper dive into several sensing approaches that have seen significant progress, including electrochemical aptamer-based sensing, molecular pendulum sensing, fluorescence-based sensing, and particle-motion sensing.

Now, at the 3rd CRBS Symposium, we turn our attention to an area of healthcare that deserves significant attention from the biosensing community: Parkinson's disease (PD).

A cornerstone of PD treatment is levodopa, yet its effects are often difficult to predict. People living with Parkinson's disease can respond very differently to the same dose of levodopa, even under similar circumstances. While this variability is widely recognized, the underlying dynamics of the drug within the body largely remain invisible in everyday clinical practice.

This symposium brings together patients, clinicians, and researchers to explore how these hidden dynamics can be made visible, bridging lived experience and real-time monitoring. By bringing together different perspectives, we hope to inspire new insights and accelerate progress toward more personalized and effective care. We look forward to the contributions of our speakers and to engaging discussions with all participants!

Finally, I would like to express my gratitude to everyone who helped make this symposium possible: our speakers, the SensUs team, Eindhoven University of Technology, and all those working on stage, behind the scenes, and online. Thank you all for your dedication, support, and contributions.

I wish you a symposium filled with connection and inspiration!

Prof. Menno Prins

Focus of the symposium

(i) The Patient Perspective: living with unpredictable treatment effects
(ii) The Neurologist Perspective: clinical decisions without pharmacokinetic data
(iii) Making the Invisible Visible: continuous real-time levodopa monitoring
(iv) From Monitoring to Treatment: the path from measurement to adaptive treatment

Tuesday, 25 August 2026 | TU/e Atlas Building (0.820) & online

15:30 - 15:40 CEST	Welcome and Introduction (Menno Prins, TU Eindhoven)
15:40 - 16:05 CEST	**Erik Jan Marinissen (imec, Belgium and TU Eindhoven)** Levodopa Experiencces from a PD Patient's Perspective; Q&A (10')
16:05 - 16:30 CEST	**Saman Vinke (Radboudumc, the Netherlands)** From Pills to Pulses: Why Levodopa Fluctuations Matter in Advanced Parkinson's Disease; Q&A (10')
16:30 - 16:55 CEST	**David Probst (University of North Carolina at Chapel Hill, USA)** Challenges and Opportunities in Continuous Levodopa Monitoring for the Management of Parkinson's Disease; Q&A (10')
16:55 - 17:25 CEST	Break and Poster Market
17:25 - 17:50 CEST	**Bo Liang (Zhejiang University, China)** Toward Closed-Loop Parkinson's Therapy: An Implantable nanoMIP Sensor for Real-Time Monitoring of Levodopa in Interstitial Fluid, Q&A (10')
17:50 - 18:20 CEST	**Joseph Wang (UC San Diego, USA)** L-Dopa Monitoring: From disposable Strips to Continuous Dopa Monitoring (CDM), Q&A (10')
18:20 - 18:30 CEST	Open discussion and closing

Speakers

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Erik Jan Marinissen

Scientific Director,
imec (Belgium)

Erik Jan Marinissen (MSc, PDEng) is Scientific Director at imec in Leuven, Belgium, the world-leading research institute in semiconductor scaling. He leads research on test and design-for-test, covering topics including 3D-stacked ICs, silicon photonics, sub-5nm CMOS technologies, and STT-MRAM. He is also a Visiting Researcher at Eindhoven University of Technology (TU/e), the Netherlands. Previously, he held research positions at NXP Semiconductors and Philips Research Laboratories in Eindhoven, Nijmegen, and Sunnyvale. He received an MSc degree in Computing Science (1990) and a PDEng degree in Software Technology (1992), both from TU/e. (More bio at https://orcid.org/0000-0002-5058-8303)

Levodopa Experiences from a PD Patient's Perspective

Despite its many motor symptoms, Parkinson's disease (PD) is a progressive neurological disorder caused by the gradual degeneration and loss of dopamine-producing neurons in the substantia nigra at the center of the brain. The gold-standard treatment for PD is levodopa. Unlike dopamine, levodopa crosses the blood-brain barrier, where it is converted into dopamine and alleviates motor symptoms.

We present a simplified pharmacokinetic ADME model that provides a coarse, first-order approximation of medicine-induced levodopa levels in human blood plasma and compare its predictions with my day-to-day patient experience.

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Saman Vinke

Consultant Neurosurgeon,
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Dr. Saman Vinke is a Consultant Neurosurgeon and Associate Professor of Invasive Neuromodulation & Translational Neuroengineering at Radboud University Medical Center (RadboudUMC) in the Netherlands. He has a subspecialty in Neuromodulation, with a strong focus on MRI-guided Deep Brain Stimulation (DBS). Through his research, he aims to personalize patient treatment, specifically neuromodulation therapies, by integrating knowledge from the disciplines of computational neuroimaging, artificial intelligence, electrical field modelling, and translational neuroengineering.

From Pills to Pulses: Why Levodopa Fluctuations Matter in Advanced Parkinson's Disease

Levodopa is the most effective medication for treating the motor symptoms of Parkinson's disease. In the early stages of the disease, patients often experience stable symptom control throughout the day. However, as Parkinson's disease progresses, the brain becomes less able to store and regulate dopamine. As a result, patients become more dependent on the rise and fall of levodopa levels in the bloodstream. These fluctuations can lead to alternating periods in which symptoms are well controlled ("ON" periods) and periods in which symptoms return ("OFF" periods). Some patients also develop involuntary movements called dyskinesias.

This talk will focus on how changes in levodopa levels contribute to motor fluctuations in advanced Parkinson's disease and why standard oral medication may become less effective over time. The concept of continuous symptom control will be discussed, as well as treatment strategies aimed at reducing fluctuations.

Finally, the rationale for advanced therapies such as deep brain stimulation (DBS) will be presented. DBS works by modifying abnormal brain activity within movement-related networks and can help reduce motor fluctuations and improve quality of life in selected patients. Understanding these mechanisms is important for recognizing when advanced therapies may be beneficial.

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The University of North Carolina at Chapel Hill

David Probst

Post Doc Research Associate, UNC Chapel Hill (USA)

Dr. David Probst is Post-Doctoral Research Associate in the Lampe Joint Department of Biomedical Engineering at the University of North Carolina Chapel Hill and North Carolina State University (BME UNC/NCSU). He completed his PhD in Biomedical Engineering at BME UNC/NCSU in 2024, focusing on the development of novel electrochemical sensors targeting on Diabetes, and Parkinson's disease. Prior, he worked at Medtronic Inc. for 5 years developing biosensors for continuous monitoring of cardiovascular, diabetes, and neurological diseases. Over this period David has published 20 peer reviewed articles and has 12+ granted patents on topic of biosensors for continuous monitoring both from academia and industry. He currently is the CTO and Co-Founder of LevoSens, working to commercialize continuous levodopa monitoring for Parkinson's Disease management.

Challenges and Opportunities in Continuous Levodopa Monitoring for the Management of Parkinson's Disease

Continuous glucose monitoring has laid the framework for both how to develop continuous biosensors, as well as translating continuous biosensors from benchtop toward commercialization. Other biomarkers have seen similar progress and opportunity, in particular levodopa being an ideal target of continuous biosensing. Over the last two years we have been working to develop a levodopa biosensor using an engineered direct electron transfer type enzyme, paired with multimodal electrochemical transduction. We aim to translate this work toward commercialization, derisking both the technology, as well as addressing non-technical questions, including regulatory, clinical, and reimbursement pathways for such a device. Here we will discuss the current progress of the continuous levodopa monitoring system and discuss some of the key non-technical challenges faced along the way, some specific to our proposed system, and others which may be general challenges for upcoming continuous levodopa monitoring systems.

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Bo Liang

Associate Professor,
Zhejiang University (CN)

Dr. Bo Liang is an Associate Professor at the College of Biomedical Engineering and Instrument Science in Zhejiang University and a recipient of the Zhejiang Provincial Science Fund for Distinguished Young Scholars. His current research focuses on wearable biosensing technologies and in vitro diagnostic instrumentation. He has presided over multiple prestigious projects, including the National Key R&D Program (where he serves as the Chief Young Scientist), the National Natural Science Foundation of China, and key projects supported by Zhejiang Province, and was honored as an "Outstanding Young Scholar in China's Engineering Frontiers" by the Chinese Academy of Engineering.

Parkinson's Therapy: An Implantable nanoMIP Sensor for Real-Time Monitoring of Levodopa in Interstitial Fluid

Levodopa's clinical efficacy is severely compromised by a narrow therapeutic window and significant pharmacokinetic variability. Conventional monitoring strategies fail to capture its rapid dynamics of metabolism, often leading to suboptimal dosing and motor complications.

To address this challenge, we report a novel implantable electrochemical sensing platform for continuous, real-time levodopa monitoring within the subcutaneous interstitial fluid (ISF). The sensor features a nanoMIP-functionalized spindle-shaped carbon nanotube fiber (SS-CNTF). By engineering a core-shell nanostructure (CNT-nanoMIP) on individual nanotubes, we achieved highly specific levodopa recognition while effectively blocking interference from complex biological matrices. In healthy and PD rat models, the sensor successfully captured complete levodopa pharmacokinetic curves in ISF, validating a strong correlation with plasma concentrations. The system provided critical therapeutic insights, demonstrating that high-frequency, low-dose administration or controlled-rate infusion could significantly mitigate pharmacokinetic fluctuations compared to standard bolus injections. This work highlights the potential of implantable nanoMIP sensors to transform PD management by providing continuous feedback for precision dosing, ultimately moving toward closed-loop PD therapy.

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Joseph Wang

Professor,
UC San Diego (USA)

Joseph Wang is a Distinguished Professor of Chemical and Nanoengineering, a SAIC Endowed Professor and the Director of the Center of Wearable Sensors (CWS) at the University of California San Diego (UCSD), La Jolla USA. Before joining UCSD at 2008, Wang served as the Director of the Center of Bioelectronics at the Biodesign Institute of ASU (Tempe, AZ). Dr. Wang has made pioneering contributions to the fields of wearable sensors, biosensors, electroanalytical chemistry, remote in-situ environmental sensors, multi-modal sensors, and microscale robots. He is a member of the US National Academy of Inventors, and of the European Academies of Engineering and of Science and Arts, and a fellow of the RSC, ECS and AIMBE. He has authored over 1300 research papers, 12 books, and 60 patents. Wang has been a Thomson Reuters Highly Cited Researcher since 2015 (H Index 225). Wang holds Honorary Professor from 11 different universities.

L-Dopa Monitoring: From disposable Strips to Continuous Dopa Monitoring (CDM)

This presentation will describe our decade-long journey (along with Prof Irene Litvan) towards on-site and on-body measurements of L-Dopa. The new electrochemical sensors rely on tyrosinase based electrode surfaces and the detection of the quinone product. Our early efforts focused on disposable test strips for rapid and frequent decentralized testing of L-Dopa in sweat or blood. Recent efforts, aiming a capturing the L-Dopa dynamics, have focused on minimally-invasive and non-invasive continuous Dopa monitoring (CDM) using ISF and sweat biofluids using wearable microneedles and epidermal fluidic devices. These advances and prospects for close-loop management of PD management will be discussed.

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TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Menno Prins

Professor, TU Eindhoven (NL)
& Helia Biomonitoring (NL)

Dr. Menno Prins received a PhD in physics and worked for nearly 20 years in Philips Research. Since 2014 he is a professor at Eindhoven University of Technology, in the Molecular Biosensing group in the departments of Biomedical Engineering and Applied Physics. He investigates particle-based single-molecule technologies for the continuous monitoring of biomolecules. To stimulate education and innovation in the field of biosensing, he founded SensUs, the annual international student competition on biosensors for health, that is organized for students by students. He co-founded Helia Biomonitoring, a spin-off company for translational development of continuous biosensing technologies.

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TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

SensUs

SensUs is the annual international student competition on sensors for health. By involving students, industry, patients and healthcare professionals, we strive to accelerate the development and innovation of biosensors and to stimulate education in this field. The stakeholders meet each other during the SensUs Innovation Days. SensUs is organised for students by students. The SensUs Organisation consists of a team of students from different departments at the Eindhoven University of Technology, the Netherlands.

SensUs
Let's compete for quality of life!

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Notes

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