WEDNESDAY 08:30 − 12:30

Innovative Semiconductor Device Architectures and Accurate Modeling for Emerging Applications

WW01
EuMC

Chair: Kenjiro Nishikawa [1]

Co-Chair: Kazuya Yamamoto[2]

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Room: Juliana CZ1

As it is well known, III-V-based amplifiers, especially GaN-based power amplifiers (PAs), are becoming popular even in communication fields such as sub-7GHz (FR1) base-stations and millimeter-wave satellite communication fields as well as military radar fields. InP-based low-noise amplifiers operating under cryogenic environments and diode-based rectenna have also been focused on by practical use of quantum computing and RFID/Sensing systems.

Despite these advancements, many circuit designers, particularly those working on GaN-based PA development, frequently express dissatisfaction with the design accuracy, largely attributable to the limitations and inaccuracies of existing transistor models. In the domain of cryogenic low-noise

amplifiers, a substantial number of designers remain unaware of critical device-specific challenges and key design considerations, including precise transistor modeling. Furthermore, circuit designers engaged in the development of wireless power transfer (WPT) systems have the potential to leverage emerging technologies, such as graphene-based diodes integrated on flexible substrates, which could enable the realization of highly efficient and practical wireless power transfer solutions.

This workshop aims to address the pressing challenges faced by circuit designers by exploring innovative semiconductor device structures and advanced modeling techniques. While bridging the gap between theoretical advancements and practical

commercialization, the research seeks to empower designers to achieve greater accuracy and efficiency in the design of cutting-edge semiconductor devices and systems.

It is, therefore, expected that the workshop attendees will be very useful for III-V-based device and amplifier designers; students, beginners, or less-experienced circuit/device designers as well as actual experts engaged in circuit- and device-developments for practical applications from sub-7GHz to millimeter-waves.

This proposal is endorsed by MTT-S TC-9.

PROGRAMME

Fundamentals and modeling techniques of high-power GaN HEMT devices for PA applications in sub-7 GHz base transceiver stations

Ken Kikuchi [1]
[1]Sumitomo Electirc Device Innovations, Inc

GaN HEMT Memory Effects and their Impact on RF PA Linearizability

Luis Cotimos Nunes[1]
[1]University of Aveiro

GaN Device Modeling for Trapping Effects and Its Applications

Yutaro Yamaguchi[1]
[1]Mitsubishi Electric Corporation

Low-power optimization of HEMT LNAs in quantum computing

Jan Grahn [1]
[1]Chalmers University of Technology

Advanced Graphene-based diode for high-efficient rectifiers

Renato Negra [1]
[1]RWTH Aachen University