Singapore Section

IEICE Singapore Section

2026 Meeting

Dr. Subramaniam Arul kumaran

Nanyang Technological University

Singapore

Singapore

Organization:

Total members: 12

Current Rep. : Dr. Subramaniam Arul kumaran, NTU

Singapore

Boosting Engagement – Strategies for Overseas Section Growth

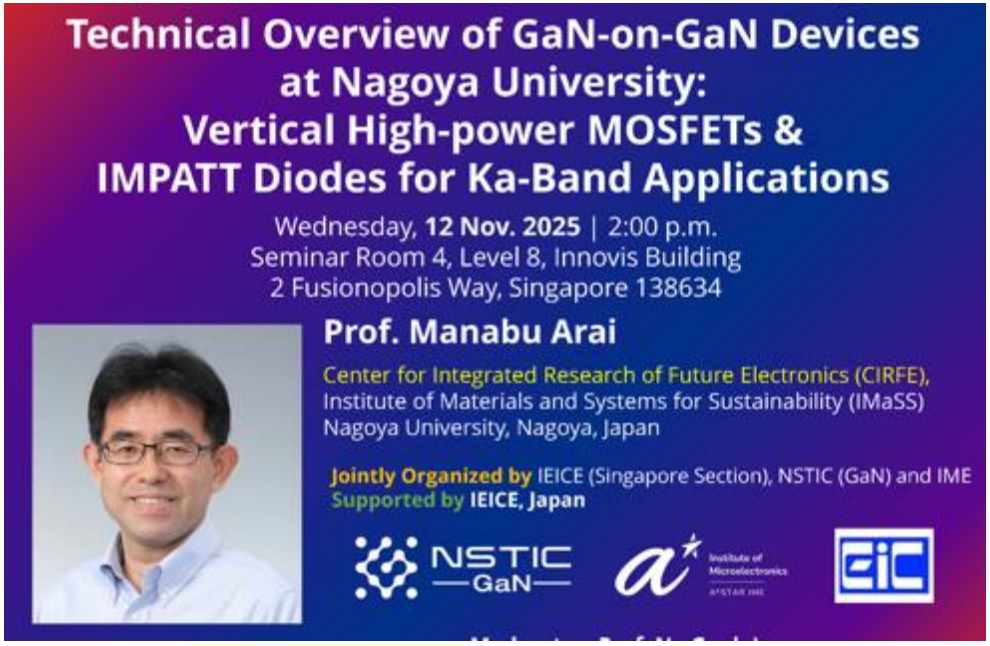
1. **Satisfaction and challenges** regarding current activities
    1. Satisfaction (Refer next slide)
        1. Financial support to invite Professors / Scientists from overseas to Singapore (Deliver Lectures and Discussions) – Able to reimburse the expenses to the respected invitees.
        2. This leads to have joint collaborative research work
    2. Challenges
        1. Increase the number of overseas members
        2. Limited fundings to invite overseas eminent Scientists to Singapore

2. **Effective incentives** and specific needs for enhancing engagement
    1. Travel/Accommodation support to international eminent Scientists/ Professors to deliver lectures in Japan Universities / Institutes.

Singapore

Activity in 2025 Sponsored by IEICE-I

- With the sponsorship of IEICE, Singapore Section Invited an Eminent Professor from Nagoya University, Japan (RF/Power Electronics) to share his experiences/knowledge with Singapore Researchers.
- **Prof. Manabu Arai, Nagoya University** visited to Singapore (10 to 12 Nov 2025) and gave very nice seminar at NTU, Singapore and NSTIC-GaN, A*Star Institute of Microelectronics, Singapore.
- Had discussions with him for the possibility of having collaborative research between Nagoya University and NTU.
- To attract young members to IEICE, Also briefed about IEICE, Japan to the Seminar attendees



Singapore

Activity in 2025 Sponsored by IEICE-II

Technical Overview of GaN-on-GaN Devices at Nagoya University: Vertical High-power MOSFETs & IMPATT Diodes for Ka-Band Applications

Wednesday, **12 Nov. 2025** | 2:00 p.m.
Seminar Room 4, Level 8, Innovis Building
2 Fusionopolis Way, Singapore 138634

Prof. Manabu Arai

Center for Integrated Research of Future Electronics (CIRFE),
Institute of Materials and Systems for Sustainability (IMaSS)
Nagoya University, Nagoya, Japan

Jointly Organized by IEICE (Singapore Section), NSTIC (GaN) and IME
Supported by **IEICE, Japan**

Abstract

Gallium nitride (GaN) devices have been rapidly adopted in consumer electronics such as USB charging adapters. In near future, their application is expected to expand to on-board chargers for electric vehicles and power supplies for data centers. Most of the current GaN devices were fabricated on foreign substrates, Nagoya University did develop both power and high-frequency devices using free-standing GaN single-crystal substrates. This seminar covers the recent GaN device development on free-standing GaN substrates at Nagoya University.

The use of GaN single crystals enables the fabrication of vertical power devices, which can handle higher current and achieve more compact designs compared to conventional lateral HEMT structures. For realizing such power devices, ion implantation technology that selectively forms PN junctions on GaN substrates plays a crucial role. We have developed a method to effectively activate magnesium, a p-type dopant, under extremely high pressure and temperature conditions.

In addition, our studies on GaN MOSFETs focus on improving channel carrier mobility and controlling the threshold voltage and promising results have been obtained. We are also actively advancing research on power HEMTs using semi-insulating GaN substrates.

In the high-frequency device field, we are advancing the development not only of HEMTs but also the development of IMPATT diodes for high-frequency application on free-standing GaN substrates. The IMPATT diodes have successfully oscillated up to the Ka-band frequencies. The technical details will be discussed in the seminar.

About The Speaker

Manabu Arai was born in Saitama, Japan, in 1968. He received the B.E., M.S., and Ph.D. degrees in Electrical and Communications Engineering from Tohoku University, Miyagi, Japan, in 1992, 1994, and 1997, respectively. In 1997, he joined New Japan Radio Co., Ltd., Saitama, Japan. His professional experience includes the development of microwave vacuum tubes and high-frequency SiC devices, as well as various power devices such as silicon super-junction transistors, SiC diodes, SiC MOSFETs, SiC-IGBTs, and AlGaN/GaN HEMTs on silicon. Since 2020, he has been affiliated with Center for Integrated Research of Future Electronics (CIRFE), Nagoya University, Aichi, Japan, where he has been engaged in research on GaN power devices, (including HEMTs and MOSFETs) and IMPATT diodes for microwave oscillators, as well as planning national projects.

He is the Chair of the Technology Committee on Electron Devices of the Institute of Electronics, Information and Communication Engineers (IEICE). He also serves as a committee member of the Advanced Power Semiconductor Division of the Japan Society for Applied Physics (JSAP) and is a member of the Institute of Electrical and Electronics Engineers (IEEE).

Brought to you by IEICE (Singapore Section), NSTIC (GaN) and IME

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Activity in 2025 Sponsored by IEICE-III

Singapore

IEICE Sponsored Seminar at Singapore

Briefed to the attendees about the service of the IEICE, Japan by Prof. Arai

Singapore

Lab Visit during the Prof Arai's Singapore Visit : NSTIC-GaN

Wafer Fabrication Capability at NSTIC-GaN

Singapore

Activity Plan in 2026 Fiscal Year-I

- The Seminar/Talk can potentially motivate the local researchers to take part of the IEICE Singapore Section's current and future events.
- In addition, this will be a seed to have a closer interaction between both parties and/or to initiate the collaborative research between Singapore Universities/Industries and Japan Universities/Industries.

Activity Plan in 2026 Fiscal Year-II

- Planning to invite at least two Scientists/Professor from Japan Institute / Universities to visit Singapore to deliver lectures.
- Also, it is planned to make the IEICE membership drive to recruit new members and give a talk on the IEICE membership benefits, as well.

Singapore

The Unique Role of IEICE Global Sections

1. Perspectives on **the role of overseas sections** in the era of globalization
    1. To invite Scientists/Professors to provide lectures in Singapore Universities/Institutes/Companies.
    2. Proposal to arrange online seminars those who are not having sufficient time to travel.

2. **Concrete proposals** to promote participation among young members in your section
    1. Encouraged students and industry people to join as a member in the IEICE society.
    2. Initiation to mobilize more new members into IEICE Societies.
        - Providing travel support to the selected PhD Students (IEICE member) to present papers in international conferences.
    3. Collaborating with Local Universities, Research Institutes and Industries to get its roots into more members.
    4. Arranging special Seminars/Talks by Japanese/International experts in Singapore to create a strong worldwide network with the help of IEICE Singapore section.
    5. To have more interaction in Singapore section, IEICE may jointly organize conference/symposium with the huge IEEE Singapore section. This will also motivate the IEEE members to join in IEICE, Japan.
    6. Another option is to sponsor a full/half day session in any of the high impact conference/symposium held in Singapore.
    7. To make the IEICE membership drive to recruit new members

Singapore

Thank You

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