

2020 IEDM Conference Theme

Innovative Devices for
a Better Future



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2020 IEEE International Electron Devices Meeting

December 12th – 16th, 2020

Hilton San Francisco Union Square
San Francisco, California

Call for Papers

Submission deadline: July 24th
Single submission of final, four-page paper

Topics

IEDM encourages submissions in all areas with special emphasis on:

- Neuromorphic computing / AI
- Quantum computing devices
- Devices for RF, 5G, THz and mm-wave
- Advanced memory technologies
- Technologies for advanced logic nodes
- Non-charge-based devices and systems
- Advanced power devices, modules and systems
- Sensors, MEMS and bioelectronics
- Package-device level interactions
- Electron device simulation and modeling
- Robustness/security of electronic circuits and systems
- Optoelectronics, displays and imaging systems

Meeting Highlights

- Three plenary presentations by prominent experts
- Special focus sessions covering topics in:
 - Technologies enabling 5G and beyond
 - Future interconnect technology
 - Device technologies for cryogenic electronics
 - Advanced IC design and integration in wide-bandgap technologies
 - Energy harvesting and wireless power transmission
 - Next Generation Design-Technology Co-Optimization (DTCO)
- Evening panel discussions
- Six tutorial sessions on Saturday, December 12th
- Two short courses on Sunday, December 13th
- Exhibits on December 14th – 16th

Papers in the Following Areas Are Requested

ADVANCED LOGIC TECHNOLOGY (ALT): Papers are solicited in the areas of CMOS platform technology, logic circuit design challenges, advanced node process integration schemes, process module advancements and process control techniques, and device technology co-optimization solutions. Platform technologies include the state-of-art Si technologies, beyond Si channel such as SiGe/Ge, and advanced device technologies such as GAA nanowire and stacked nanosheet. Topics include device, interconnects and circuit performance, scaling issues and PPA analysis. Papers may address process development and module integration for heterogeneous channel materials, substrate and isolation technologies, shallow junctions, gate stacks, contacts, interconnects, stacked and monolithic 3D, packaging, chiplet, BEOL-compatible transistors and variability reduction. Submission of papers discussing interactions between advanced technology and design issues such as variability, aging, power constraints, physical layout effects and DTCO solutions is encouraged.

EMERGING DEVICE and COMPUTE TECHNOLOGY (EDT): Papers are solicited on emerging nanoelectronic devices and physics. This includes devices based on novel transport mechanisms such as tunnel FET, negative capacitance FET, topological insulators, phase transitions, and quantum effects. Devices based on low-dimensional systems including 2D materials, nanowires, and quantum dots are welcomed. Neuromorphic and approximate computing devices as well as non-charge-based logic such as magnetic logic, and spintronics are key topics. Furthermore, emerging state machines, continuous time dynamical systems, and lifelong learning machines are also of interest. Qubit devices as well as devices and systems designed to enable quantum computing and quantum simulation are of high interest. Papers in EDT focus primarily on device physics, innovative transistor structures, and novel concepts; more mature "platform candidate" papers should be submitted to ALT. Reliability assessment of emerging devices are also solicited here, while such assessments for more mature technologies/devices should be submitted to RSD.

MEMORY TECHNOLOGY (MT): Papers are solicited in all memory technology topics, including embedded and standalone memories, as well as computing-in-memory, machine learning applications. Topics span from novel concept cells to fully integrated memories, from prototyping to manufacturing issues and performance. Specific areas of interest include both conventional and novel memory cells including charge-based memories, ReRAM, MRAM, PCRAM, FeRAM, crosspoint and selectors, organic memory and NEMS-based devices, including their design and scaling, processing, reliability, and modeling. Novel concepts and demonstrations that enhance memory properties or apply to AI computing paradigms are of interest. Higher-level topics include 3D architectures and integration, novel read/program/erase schemes, solid state drive (SSD) applications, novel hierarchies and architectures for memory-centric systems, security, computing-in-memory and nonvolatile memory-enabled applications.

MICROWAVE, MILLIMETER WAVE and ANALOG TECHNOLOGY (MAT): Papers are solicited in the areas of high-frequency device technology, device physics, packaging technology, and high-frequency circuit applications in the micro, mm-wave and THz frequency spectrum. Device processes of interest include Si-based RF CMOS, such as FD-SOI and FinFET processes and SiGe HBTs. Compound semiconductors including InP/InGaAs/GaAs III-V HEMTs, FETs, DHBTs, mm-wave Schottkys and other microwave-enabling devices are also of key interest, as well as AlGaIn/InGaIn/GaN processes and devices optimized for RF performance. Other wide bandgap and organic RF-compatible devices and processes are also of interest. The area also includes passive devices implementing tunable passives, microwave and mm-wave switches and SAW/BAW filters. 3D and heterogeneous integration, chip-and-wafer level packaging and assembly, and thermal management, as well as basic RF-device modeling and reliability aspects are also covered. The circuit aspects covers analog front ends for 5G and beyond, mixers, transceivers, filters, beam formers, switches, LNAs, PAs, tunable passives, antenna arrays, as well as mixed signal implementations in the micro and mm-wave domain. Devices and circuits for RF energy harvesting, and RF device and circuit interaction are also a good fit.

MODELING and SIMULATION (MS): Papers are solicited in the areas of analytical, numerical, and statistical approaches to model electronic and other domain's device components and physical phenomena. Topics include physics-based compact and TCAD models for transistors, memories and interconnects; the modeling and emulation of IC fabrication processes and equipment; atomistic-scale material modeling; circuit design-oriented modeling of variability, reliability and yield issues; 3D integration and advanced packaging models. Other beyond-CMOS topics include alternative computing schemes (e.g. neuromorphic, stochastic, approximate and quantum computing), spintronics, photonics and electro-chemical/mechanical device modeling. Submissions should advance the state-of-the-art in modeling and simulation methodology or apply existing techniques to gain new insights into device behaviors.

OPTOELECTRONICS, DISPLAYS, and IMAGING SYSTEMS (ODI): Papers are solicited on optoelectronics, displays, and imaging systems. This includes novel devices, structures, and integration for image sensors, displays, light sources, photonic devices, and high-speed photodetectors and modulators. New technologies on heterogeneous integration of opto-electronics as well as on photonic-electronic integration for optical interconnects, on-chip networks and sensing are welcomed. Papers on quantum photonics and plasmonics for computation, sensing and encryption are also of interest. Furthermore, ODI includes CMOS imagers, high-speed and high-time resolution imagers, CCDs, stacked image sensors, and displays of all types. In addition, papers on TFTs, flexible, stretchable, and/or printed electronics are encouraged. Papers on CMOS integration of thin film electronics for non-optical applications should be submitted to ALT. We particularly welcome submissions concerning optoelectronic devices for neuromorphic and quantum computing, as well as VCSEL sensors, micro LED, and flexible displays.

POWER DEVICES and SYSTEMS (PDS): Papers are solicited on discrete and integrated power devices, modules and systems using Si, diamond, and compound semiconductors. Papers exploring the system-level impact of power devices are also of interest. Topics of interest include device architectures (diodes, BJTs, FETs, superjunction devices, IGBTs, HEMTs, etc.), and materials (Si, diamond, SiC, GaAs, GaN, AlN, Ga₂O₃, etc.) for power applications, in addition to manufacturing processes, device design, TCAD and physical modeling (compact modeling should be submitted to MS), fundamental physical effects, and reliability. Devices targeting the full range of power and power conversion applications, including automotive, power supplies for computers and data centers, power conditioners for photovoltaic, motor drives and smart grid (solid-state transformers and HVDC transmission), and wireless power transfer, are of interest besides fundamental studies on doping, deep-level traps, interface state densities and device reliability for power switching devices.

RELIABILITY OF SYSTEMS and DEVICES (RSD): Papers are solicited in all areas of electrical and physical characterization, reliability evaluation and yield analysis of transistors, interconnects, circuits and systems mainly (but not limited) to Si-based technologies. Specific reliability topics include, for FEOL: transistor degradation due to hot carriers and bias temperature instabilities; dielectric wear-out and breakdown; self-heating effects; process charging damage; latch-up and ESD; soft error mechanisms in logic and memories. For MEOL/BEOL, topics include: electromigration failure of contacts and interconnects; breakdown of BEOL dielectrics and MEOL spacers; thermal management. For system and circuit reliability topics include: design for reliability and variability-aware design, robustness and security of electronic circuits and systems. Of particular interest are investigations of degradation mechanisms for devices, circuits and systems in the following area: 5G; IOT; emerging memories; more-than-Moore applications; biomedical devices and systems; wearable electronics; automotive and aerospace. Reliability assessment of mature memory technologies/devices should be submitted to MT.

SENSORS, MEMS, and BIOELECTRONICS (SMB): Papers are solicited in the areas of sensors, micro/nano electromechanical systems (MEMS and NEMS), microfluidics and BioMEMS, with particular emphasis on new device concepts, integrated implementations, CMOS co-integration, flexible devices and multi-sensors on a chip for wearable and IoT applications. Sensors area includes chemical, molecular and biological detection based on electrical, electrochemical, mechanical and optical principles. Topics of interest in the MEMS area include actuators, physical sensors, resonators, integrated inertial measurement units, RF MEMS, micro-optical and optomechanical devices, micro power generators, MEMS devices for energy harvesting and on-chip energy storage as well as micro/nanofluidics for thermal management. BioMEMS area covers organic-inorganic hybrid devices, bio-electronic interface, integrated biomedical sensing and implantable neural interfaces.

Preparation of Full Papers

Papers must be submitted electronically in IEEE Xplore-compatible pdf format. The deadline for submission of papers is July 24th, 2020. PRIOR to preparing your paper for electronic submission, please read the paper preparation and submission guidelines below. A paper template and sample paper are available at: iee-iedm.org/preparation-of-papers

Papers Must Clearly State

- The purpose of the work
- The manner and degree to which it advances the art accompanied by proper references
- Specific new results that have been obtained with clear experimental conditions and their significance

The degree to which the paper deals with these issues will strongly affect whether the paper is accepted. The most common cause of rejection of submitted papers is a lack of specific results. Only work that has not been previously published nor submitted elsewhere at the time of the conference will be considered. Paper acceptance will be based solely on the information provided on the four page paper submitted. Promises of upcoming results will be ignored. All submissions will be checked for plagiarism.

Electronic Submission

Only electronic submissions through the paper submission system linked to the conference website will be accepted. Do not email files to the conference office. In order for your paper to receive a full review, the following information MUST be entered on the website along with your submission:

- Title of paper
- Name, complete mailing address and phone, and email of first author
- Names, affiliations, city, state, country of additional authors
- Person to whom correspondence should be sent, if other than the first author
- Identification as invited or student paper and student travel request, if applicable
- Suggested area (as listed in this announcement) into which the paper fits
- 50-word abstract

Papers Must Include

- Title of paper
- Name, complete mailing address, phone, and email of first author and name, affiliation, city, state and country of additional authors
- Up to two pages of text and up to two additional pages of figures and drawings (no text, captions only) in 8-1/2" x 11" format describing the planned 20-minute paper and emphasizing the findings. The font size for the body of the text and in figures and captions must be at least 10 point.
- Excessive photo reduction of figures and poor legibility will negatively impact acceptance
- Papers with more than 2 pages of text or figures shall be grounds for immediate rejection
- Please avoid the use of special international fonts

50-Word Web Page Abstract

This abstract is a brief synopsis (50 words) of your paper. Accepted 50-word abstracts will be used in preparing the IEDM web pages. The abstract should be prepared and provided during the submission process in the requested text field on the submission web site. **DO NOT INCLUDE** the 50-word abstract as a separate page with your submission.

For questions contact the conference office:

Phyllis Mahoney
IEDM
8512 Fountain Valley Drive
Montgomery Village, MD 20886 USA
Tel: 240-449-6746
Email: iedm-info@ieee.org

Notification of Acceptance

Authors of accepted papers will be notified by the end of September. The accepted paper will be published as-is in the Technical Digest of the 2020 IEDM. Publication in the digest in no way precludes later publication of a fuller account of the work in another journal, but **NO PUBLICATION** is acceptable before the conference. The paper must be presented at the conference by one of the listed authors.

Student Presentation of Papers Encouraged

Papers presented by students and based on their own work will be considered for the Best Student Paper Award. In addition, outstanding student papers will be invited to submit an extended version of their IEDM paper to an IEDM Special Issue in the IEEE Transactions on Electron Devices. The paper must be identified as a student paper at the time of submission. The award is based on both the paper and the presentation which must be given by the student. The award will be announced and presented at the 2021 IEDM.

Student Speaker Financial and Travel Assistance

Financial assistance for travel and registration is available to students presenting papers. This applies also for overseas students. Assistance must be requested when the paper is submitted by choosing this option on the submission website (under "Type"). Further information on travel assistance will be included in the student's author kit. Late News Papers are not eligible for travel assistance or the student paper award.

Pre-Conference Publicity

The accepted 4-page papers and supporting information will be used by IEDM for publicity and portions of these papers may be quoted in pre-conference magazine articles and also via the Web. If this is not acceptable, authors must indicate this on the web site when submitting the papers for review. Questions regarding pre-conference publicity should be addressed to the conference public relations manager, Chris Burke at (email: cburke@btbmarketing.com and tel. 1-919-872-8172) and Gary Dagastine (email: gdagastine@nycap.rr.com and tel. 1-518-785-2724).

Agreement Not to Pre-Publish

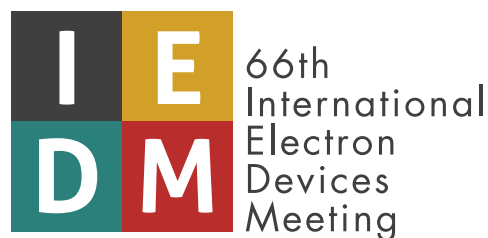
Submission of a paper for review and subsequent acceptance is considered by the committee as an agreement to the IEEE submission policy that the work will not be published by the author prior to the conference. Accepted papers or significant portions of the work must not be published in any other conference presentations with or without proceedings prior to the conference. Violation will be grounds for automatic withdrawal of the paper by the conference committee.

Late News Papers

Deadline for receipt of papers is August 31st, 2020.

A very limited number of Late News Papers will be accepted. Late News Papers are not eligible for travel assistance or the student paper award.

Authors are asked to submit late news papers announcing only very recent developments. Papers should be in the same format as a regular paper and should be submitted through the submission web site in the same way as for regular submissions. Authors of accepted papers will be notified by the end of September.



For Further Information

All questions or inquiries for further information regarding this meeting should be directed to the Conference Office at:

8512 Fountain Valley Drive
Montgomery Village, MD 20886 USA
Tel: 240-449-6746
Email: iedm-info@ieee.org

Local European Contact

Geert Eneman
Imec

Local Asian Contact

Kang-ill Seo
Samsung

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University of Notre Dame

Technical Program Chair

Tibor Grasser
TU Wien