IEEE Nanotechnology Council
Newsletter, October - 2018

IEEE Advancing Technology for Humanity

IEEE NANO Nanotechnology Council

Inside This Issue:

- [IEEE-NTC elected President and Officers](#)
- [Nobel Prize for 2018 in Science](#)
- [Distinguished Lecturers](#)
- [T-Nano Best Paper Award 2017](#)
- [Conferences in Focus](#)

Special points of interest:

- Prof. Toshio Fukuda—elected as the IEEE President elect 2019-20.
- The inventor of Optical Tweezers got Nobel Award in Physics.
- IEEE-NTC Facebook page received overwhelmed support and crossed 13,000!

For more details and updates visit IEEE—Nanotechnology Council's Official website: https://ieeenano.org/.

Deadline Extended for Call for Nominations for 2019 IEEE Nanotechnology Distinguished Lecturers

The deadline for submission of nominations for the 2019 IEEE Nanotechnology Distinguished Lecturers has been extended to **31 October 2018**. The term for the Lecturers is from January 1 until December 31 of 2019. The Lecturers serve for a one year term, and may be reappointed for one additional year.

See https://ieeenano.org/call-for-nominations-2019-ieee-nanotechnology-distinguished-lecturers/ for details.

Editor's Note

I am delighted to bring you the newsletter for the quarter ending October-2018. This issue brings you the latest updates and activities in the IEEE-NTC community, with a new President-Elect 2019 and other NTC officers has been elected with more details are provided in the Newsletter. I am also extremely proud to share that the IEEE NTC is currently the largest IEEE council with more than 7000 members of established and young researchers. I hope you enjoy this issue and do let us know if there is any topic you'd like to see covered in the future issue.

Jr-Hau He
King Abdullah University of Science and Technology
EiC Newsletter & Web Content

Announcement of newly elected IEEE President-elect (2020-21)

Congratulations to the founding President of IEEE Nanotechnology Council (2004-2005, 2002-2003), Professor Toshio Fukuda on being elected IEEE President-Elect, 2019. Professor Fukuda will become President of IEEE in 2020. IEEE is the largest technical professional society in the world with about 400,000 members. The IEEE Nanotechnology council Professor Fukuda founded is currently the largest Council in IEEE with more than 7000 members.

Fukuda is a professor of mechatronics engineering at Meijo University, in Nagoya, Japan. He is also a professor at the Beijing Institute of Technology and professor emeritus at Nagoya University. His research focuses on intelligent robotic systems and micro-nano robotics. He has published more than 2,000 articles in scientific journals, conference proceedings, and reports.

He was elevated to Fellow in 1995 "for the development of distributed intelligent robotics and system control with neuron-fuzzy-genetic-algorithms-based computational intelligence."

Fukuda was director of IEEE Region 10 in 2013 and 2014 and IEEE Division X director/delegate in 2001 and 2002, and 2017 and 2018. He was president of the IEEE Robotics and Automation Society in 1988 and 1989 and general chair of the IEEE International Symposium on Micro-Nano Mechatronics from 1990 to 2012. He has served on several IEEE boards and committees.

Announcement of newly elected IEEE NTC officers

The IEEE Nanotechnology Council (NTC) elected new officers at its Annual Meeting held July 23 in Cork, Ireland in conjunction with its 2018 International Conference on Nanotechnology (IEEE NANO). Representatives of the twenty-two IEEE Societies who are Council members gather annually to conduct Council business and elect officers. This year four positions were up for election: President-elect for 2019 (President in 2020-21), VP for Conferences and VP for Finances (2019-20), and a new position, VP for Education for 2018-19.

James (Jim) Morris, Professor Emeritus in Electrical and Computer Engineering at Portland State University (Portland, Oregon, USA) was elected President-elect for 2019.

Lixin Dong, Associate Professor of Electrical and Computer Engineering at Michigan State University (USA) was elected VP for Conferences 2019-20.

Malgorzata Chrzanowska-Jeske, Professor of ECE and Director of VLSI & Emerging Technology DA Laboratory at Portland State University was elected Vice-president for Finances 2019-20.

Arunkumar Subramanian, Associate Professor in Mechanical Engineering at the University of Illinois at Chicago (UIC, USA) was elected our first VP for Education for 2018-19.

All positions, except VP for Education which is effective immediately, are effective as of January 1, 2019.

For full details, see https://ieeenano.org/ieee-nanotechnology-council-elects-2019-officers/.

Nobel Awards in Science - 2018

MEDICINE:
The Nobel Assembly at Karolinska Institutet has today decided to award the 2018 Nobel Prize in Physiology or Medicine jointly to James P. Allison and Tasuku Honjo **for their discovery of cancer therapy by inhibition of negative immune regulation.**

Cancer kills millions of people every year and is one of humanity's greatest health challenges. By stimulating the inherent ability of our immune system to attack tumor cells this year's Nobel Laureates have established an entirely new principle for cancer therapy. **James P. Allison** studied a known protein that functions as a brake on the immune system. He realized the

potential of releasing the brake and thereby unleashing our immune cells to attack tumors. He then developed this concept into a brand new approach for treating patients.

In parallel, **Tasuku Honjo** discovered a protein on immune cells and, after careful exploration of its function, eventually revealed that it also operates as a brake, but with a different mechanism of action. Therapies based on his discovery proved to be strikingly effective in the fight against cancer.

Allison and Honjo showed how different strategies for inhibiting the brakes on the immune system can be used in the treatment of cancer. The seminal discoveries by the two Laureates constitute a landmark in our fight against cancer.

PHYSICS:
Tools made of light
The inventions being honoured this year have revolutionised laser physics. Extremely small objects and incredibly rapid processes are now being seen in a new light. Advanced precision instruments are opening up unexplored areas of research and a multitude of industrial and medical applications.

Arthur Ashkin invented optical tweezers that grab particles, atoms, viruses and other living cells with their laser beam fingers. This new tool allowed Ashkin to realise an old dream of science fiction – using the radiation pressure of light to move physical objects. He succeeded in getting laser light to push small particles towards the centre of the beam and to hold them there. Optical tweezers had been invented.

A major breakthrough came in 1987, when Ashkin used the tweezers to capture living bacteria without harming them. He immediately began studying biological systems and optical tweezers are now widely used to investigate the machinery of life.

GérardMourou and **Donna Strickland** paved the way towards the shortest and most intense laser pulses ever created by mankind. Their revolutionary article was published in 1985 and was the foundation of Strickland's doctoral thesis.

Using an ingenious approach, they succeeded in creating ultrashort high-intensity laser pulses without destroying the amplifying material. First they stretched the laser pulses in time to reduce their peak power, then amplified them, and finally compressed them. If a pulse is compressed in time and becomes shorter, then more light is packed together in the same tiny space – the intensity of the pulse increases dramatically.

Strickland and Mourou's newly invented technique, called chirped pulse amplification, CPA,

soon became standard for subsequent high-intensity lasers. Its uses include the millions of corrective eye surgeries that are conducted every year using the sharpest of laser beams.

CHEMISTRY:

They harnessed the power of evolution

The power of evolution is revealed through the diversity of life. The 2018 Nobel Laureates in Chemistry have taken control of evolution and used it for purposes that bring the greatest benefit to humankind. Enzymes produced through directed evolution are used to manufacture everything from biofuels to pharmaceuticals. Antibodies evolved using a method called phage display can combat autoimmune diseases and in some cases cure metastatic cancer.

Since the first seeds of life arose around 3.7 billion years ago, almost every crevice on Earth has filled with different organisms. Life has spread to hot springs, deep oceans and dry deserts, all because evolution has solved a number of chemical problems. Life's chemical tools – proteins – have been optimised, changed and renewed, creating incredible diversity.

This year's Nobel Laureates in Chemistry have been inspired by the power of evolution and used the same principles – genetic change and selection – to develop proteins that solve mankind's chemical problems.

One half of this year's Nobel Prize in Chemistry is awarded to **Frances H. Arnold**. In 1993, she conducted the first directed evolution of enzymes, which are proteins that catalyse chemical reactions. Since then, she has refined the methods that are now routinely used to develop new catalysts. The uses of Frances Arnold's enzymes include more environmentally friendly manufacturing of chemical substances, such as pharmaceuticals, and the production of renewable fuels for a greener transport sector.

The other half of this year's Nobel Prize in Chemistry is shared by **George P. Smith** and **Sir Gregory P. Winter**. In 1985, George Smith developed an elegant method known as phage display, where a bacteriophage – a virus that infects bacteria – can be used to evolve new proteins. Gregory Winter used phage display for the directed evolution of antibodies, with the aim of producing new pharmaceuticals. The first one based on this method, adalimumab, was approved in 2002 and is used for rheumatoid arthritis, psoriasis and inflammatory bowel diseases. Since then, phage display has produced anti-bodies that can neutralise toxins, counteract autoimmune diseases and cure metastatic cancer.

Source: nobelprize.org

The IEEE Nanotechnology Council (NTC) Distinguished Lecturers (DLs)

Distinguished Lecturers (DLs) serve a one year term beginning on January 1st of the year immediately following their appointment, and may be reappointed for one additional year with approval of the NTC Distinguished Lecturer Committee. A yearly budget is provided per DL to give lectures for NTC or member Society Chapters and NTC Conferences, based on availability of funding through the NTC. If other funds are available they may be used to supplement NTC funding. DLs will fill out the NTC DL Event Application form once their presentation has been arranged to obtain approvals for funding. After the lecture the DLs fill out the NTC DL Event Report form and submit their expenses using the IEEE Expense report (see instructions).

Request a Lecture
IEEE Student Branches, NTC or member Society Chapters and NTC and member Society Conferences can request NTC Distinguished Lecturers (based on availability of funding). Please contact the presenter directly to arrange for a presentation.

About IEEE NTC Distinguished Lecturers
Distinguished Lecturers (DLs) serve a one year term beginning on January 1st of the year immediately following their appointment, and may be reappointed for one additional year with approval of the NTC Distinguished Lecturer Committee. A yearly budget is provided per DL to give lectures for NTC or member Society Chapters and NTC Conferences, based on availability of funding through the NTC. If other funds are available they may be used to supplement NTC funding. DLs will fill out the NTC DL Event Application form once their presentation has been arranged to obtain approvals for funding. After the lecture the DLs fill out the NTC DL Event Report form and submit their expenses using the IEEE Expense report (see instructions).

Distinguished Lecturer Nominations
Candidates for DLs may be nominated by any current IEEE member (self-nominations are not accepted), using the IEEE NTC Distinguished Lecturer Nomination Form. DLs are expected to give a minimum of 2 lectures per year as part of their commitment to serve. The NTC Distinguished Lecturer Committee reviews nominations and recommends DL candidate appointments for NTC ExCom approval. **DL Nominations are submitted to the chair of the Distinguished Lecturer Committee by 31 October.**

IEEE NTC Distinguished Lecturer Committee
The Distinguished Lecturer Committee is a subcommittee of the NTC Technical Activities Committee (TAC), responsible for soliciting and reviewing nominations. The Committee submits recommendations for individuals to serve as DLs to the NTC ExCom for official approval. The committee consists of five members – the Vice President of Technical Activities who serves as

committee chair; the Chair of the Education Committee; the Chair of the Regional Interest Groups (Chapters) Committee; and two other members appointed by the Vice President of Technical Activities, who serve for a two year term.

Detailed report and updates of Distinguished Lectures

Prof. Jin-Woo Kim
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Programmable Molecular/Nanoscale Building Blocks and Development Strategies for Real-Time, In Vivo Molecular/Nano Sensing Platform

Abstract: Modular assembly of multiple molecular/nanoscale particles into multifunctional structures with arbitrary sizes and shapes has the potential to transform many fields of research, ranging from optoelectronics and nanophotonics to molecular/nano sensing, biosecurity, and nanomedicine. Self-assembly has emerged as a powerful and practical strategy for controlled synthesis of such multifunctional, hierarchical structures of nanoparticles (NP). Despite the promise and recent progress in NP self-assembly, the accurate, scalable, and high-rate modular assembly of heterogeneous nanocomponents into multifunctional nanoarchitectures with specifically designed shapes and functions still remains a challenge. Our research group focuses on a transformative research to develop a nano-building block toolbox ("nanotoolbox") that enables programming matter at a molecular scale, realizing a "next-generation" bio-hybrid multifunctional nano-architecture at all scales and in all three dimensions. This lecture will discuss the progresses in and challenges to the programmable and scalable self-organization of NP nanocomposites with specific shape and function. Also, it will discuss our strategies to realize the control and functionality necessary to overcome the challenges, achieve its promise for "programmable and customizable" integrations of highly functional bio-hybrid systems in desired patterns and geometries, and drive innovations in novel hybrid fused technologies, particularly for in vivo, real-time molecular/nano imaging and sensing in medicine.

Short Bio: Jin-Woo Kim is a Director of Bio/Nano Technology Group and a Professor of Biological Engineering, Biomedical Engineering and Nanoscience & Engineering at the

University of Arkansas. He received his first B.S. in Chemical & Biological Engineering from Seoul National University, the second B.S. in Microbiology from University of Iowa, the M.S. in Biology from University of Wisconsin, and the Ph.D. in Biological Engineering from Texas A&M University. His research focus is in the area of Bio/Nano Technology, i.e., biologically inspired nanotechnology, which spans interdisciplinary fields of biological engineering, biomedical engineering, biology, chemistry, and nanotechnology. Learning from biological systems in nature, his research aims to develop more effective and efficient routes to "panoscale" (i.e., 'any' scale) system integration of multifunctional hierarchical structures for biomimetic advanced materials and devices in biological and biomedical applications. He has published over 110 peer-reviewed articles, over 200 presentations with over 70 invited presentations, and 3 patents granted. He received several teaching and research awards and held for leadership positions in international professional societies, including Vice President of Publications in IEEE Nanotechnology Council (2017-2019). He has served on organizing committees for several international conferences, including steering committee members of IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED) and THz-Bio Quantum Forum, and general chair (2015), general co-chairs (2011 and 2017) and program chair (2010) of IEEE-NANOMED. He is a senior editor of IEEE Transactions on Nanotechnology and has been ad-hoc reviewers for leading journals, including Science, PNAS, and Nature Nanotechnology. He is a Fellow of the American Institute of Medical & Biological Engineering (AIMBE) and IEEE Nanotechnology Distinguished Lecturer (2017-2018).

Xiao Wei Sun

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Abstract: We present highly efficient colloidal core-shell quantum dots, quantum rods and perovskite nanocrystals for emerging energy-saving quality display and lighting applications. We applied these luminescent materials to make various devices including luminescent microspheres for on-chip InGaN LED packaging (photoluminescent applications), and assembling aligned quantum rod to make polarized emission films. These nanocrystal materials were also used to make high efficiency quantum dot light-emitting diodes.

Short Bio: Dr. Sun is presently a Chair Professor in the Southern University of Science and Technology, Shenzhen, China. He is also the Head of the Department of Electrical and Electronic Engineering and acting Dean of the College of Engineering. Before joining Southern University of Science and Technology, he had been working at Nanyang Technological

University, Singapore as a Full Professor. He was the Director, Microelectronics Center at Nanyang Technological University. He was awarded the Nanyang Award for Research and Innovation in 2009, the 1000 Talent Award by the Chinese Government in 2012, and the Jacques Beaulieu Excellence Research Chair of INRS (Institut national de la recherche scientifique), Quebec, Canada in 2013, the IEEE Nanotechnology Council Distinguished Lecturer in 2018. He is an Academician of the Asia-Pacific Academy of Materials. He is the fellow of several academic societies including Optical Society of America (OSA), SPIE, Society for Information Display (SID), and Institute of Physics (IoP, UK). He is the founder and president of the Society for Energy Photonics, a non-profitable organization promoting photonics technologies to solve energy crisis and combat global warming and climate change. He is the Chair of IEEE Beijing Section Nanotechnology Council Guangdong Chapter. He is presently an Adjunct Professor in the Department of Electrical and Electronic Engineering, Hong Kong University of Science and Technology. His main research presently is on semiconductor nanocrystals for power-saving high-quality displays and lighting.

John T.W. Yeow
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Distinguished Lecturer Talk Title: Nanodevices for Biomedical Instruments

Abstract:
The emergence of minimally invasive diagnostics and therapeutics in modern high-tech medicine has generated an unmet demand in miniaturized biomedical devices. There exist a definite need for clinical diagnostic and treatment instruments that are based on micro and nanotechnologies. In the past decade, micromachining technology and nanomaterials are making big impacts in many fields, especially in the field of biomedical engineering. The small size and low mass provided by micro/nanodevices make medical instruments portable, power efficient, and, in many cases, more effective. This talk will focus on the current development of the state-of-the-art miniaturized X-ray CT machines, endoscopic imaging devices, MEM-based confocal microscope and nanosensors. The talk will also include an introduction of the IEEE Nanotechnology Magazine. Part of the effort is to promote the magazine to students.

Short Bio: John Yeow is a Professor in the Department of Systems Design Engineering and is cross-appointed to Mechanical and Mechatronics Engineering and Electrical and Computer

Engineering at the University of Waterloo. He is also the Director of the Advanced Micro & Nanodevice Lab at the university and holds the Canada Research Chair in Micro and Nanodevices.

Professor Yeow's research expertise lies in Micro-/Nano- Electro Mechanical systems. He aims to develop mechanical machines that are integrated with microelectronics at the micron scale. New device concepts include, but are not limited to: the integration of micro-optics components, miniature signal processing devices, biomedical/genome processing devices, miniature electromechanical wireless components (filters, mixers, antennas), miniature opto-electromechanical devices (optical cross connect, optical relays, optical multiplexers, deformable optics), miniature biosensors and environmental sensors, and microfluidics devices. Professor Yeow also explores issues such as self-testing, self-assembly, and automated packaging.

He is currently developing nanodevices and highly selective sensors that will help create new medical instruments for diagnosing and treating disease. These include MEMS optical scanner for endoscopic optical coherence tomographic imaging, micromirror devices for genetic microarray reading and tissue imaging, robotics for micromanipulations of MEMS components, carbon nanotube-based sensors for biomedical applications, and lab-on-a-chip designs.

Additionally, Professor Yeow's company ARTsensing Inc. has commercialized an invention which is a product of his research – the world's first transparent and flexible radiation detector that measures ionizing radiation delivered to cancer patients during treatment.

In addition to his many accomplishments, Professor Yeow was the recipient of the Young Engineer Award from the Ontario Society of Professional Engineers in 2008.

Larry Nagahara

Johns Hopkins University, Baltimore, USA
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Convergence of Nanoscience and Nanotechnology Perspectives in Oncology: Innovative Ways to Fight Cancer

Abstract: For more than 45 years, the U.S. government declared a "war on cancer" and committed to investing in laboratory and clinical

research in order to understand the causes of cancer and thereby aid its diagnosis, treatment, and cure. Despite enormous advances and important improvements in the diagnosis and treatment of many cancers, the "war" has in significant ways progressed less than originally hoped. The complexity of the disease is evident in the dynamic and evolving course the disease takes during its progression and response treatment. Harnessing the power of nanotechnology could lead to a paradigm shift in the way we understand and ultimately and treat cancer. Novel and multi-functional nanodevices capable of detecting cancer at its earliest stages, pinpointing its location within the body, delivering anticancer drugs specifically to malignant cells, and determining if these drugs are effective is a vision shared by many scientists, engineers and clinical researchers. Recently, in-vivo nanobiosensors are able to detect tumors and metastatic lesions that are far smaller than those detectable using current, conventional technologies. Functionalized nanoparticles have delivered promising multiple therapeutic agents to tumor sites in order to simultaneously attack multiple points in the pathways involved in cancer. This lecture will describe in details some of the advances achieved these past several years and the challenges that nanotechnology faces for eliminating cancer.

Short Bio: Dr. Larry Nagahara is currently the Associate Dean for Research (ADR) in the Whiting School of Engineering (WSE) and Research Professor in the Department of Chemical and Biomolecular Engineering at Johns Hopkins University (JHU). Previously, he was the Associate Director within the Division of Cancer Biology at National Cancer Institute (NCI)/National Institutes of Health (NIH), where he directed and coordinated programs and research activities related to expanding the role of the physical sciences and engineering in cancer research. This included the largest federally-funded program dedicated to the convergence of physical and life sciences, namely the NCI's Physical Sciences–Oncology Initiative. In addition, Dr. Nagahara served as the Nanotechnology Projects Manager for the NCI's Alliance for Nanotechnology in Cancer program. Before joining NCI, Dr. Nagahara was a Distinguished Member of the Technical Staff at Motorola and led their nanosensor effort. He has published over 95 technical papers, 3 book chapters, and over 25 patents issued/filed in these fields. He is also a Fellow of the American Association for the Advancement of Science (AAAS), American Institute for Medical and Biological Engineering (AIMBE), American Physical Society (APS), IEEE, and a former member of Motorola's Scientific Advisory Board.

Call for Papers **- IEEE Journal on Exploratory Solid-State Computational Devices and Circuits**

Special Issue on Nonvolatile Memory for Efficient Implementation of Neural/Neuromorphic Computing

Guest Editor
Shimeng Yu, Georgia Institute of Technology, shimeng.yu@ece.gatech.edu
Editor-in-Chief
Ian Young, Intel, ian.young@intel.com

Aims and Scope
In recent years, artificial intelligence based on machine/deep learning has shown significantly improved accuracy in large-scale visual/auditory recognition and classification tasks, some even surpassing human-level accuracy. In particular, deep neural networks (DNN) and their variants have proved their efficacy in a wide range of image, video, speech, and biomedical applications. To achieve incremental accuracy improvement, state-of-the-art deep learning algorithms tend to aggressively increase the depth and size of the network, which imposes ever-increasing computational capacity and storage cost in hardware. Though GPUs are the dominant technology in the training of the DNN models at the cloud, specifically designed ASIC hardware accelerators have been developed to run large-scale deep learning algorithms for inference (or even training) on-chip. This provides opportunities to bring the AI closer to the edge device for applications such as autonomous driving, machine translation, and smart wearable devices, where severe constraints exist in performance, power, and area.

In particular, the silicon CMOS ASIC designs show that limited on-chip memory capacity is the biggest bottle-neck for energy-efficient neural/neuromorphic computing, in terms of storing millions/billions of parameters and loading/communicating them to the place where computing actually occurs. Today's ASIC designs typically utilize SRAM as the synaptic memory. Although SRAM technology has been following the CMOS scaling trend well, the SRAM density and on-chip SRAM capacity are insufficient for storing the extremely large number of parameters in deep learning algorithms. Leakage current is undesirable, and parallelism is limited due to row-by-row operation in the digital SRAM array. As an alternative hardware platform, non-volatile memory (NVM) devices have been proposed for weight storage with higher density and fast parallel analog computing with low power consumption. A special subset of NVM devices that show multilevel resistance/conductance states could naturally emulate analog synapses in the neural network. Because NVMs are potentially higher density than SRAM, they could hold most of the weights on-chip, thereby reducing or eleminating the off-chip memory access (i.e. from DRAM). The parallelism of the crossbar arrays for matrix-vector multiplication (or dot

product) further enables significant acceleration of core neural computations. NVMs also offers much lower standby leakage, which could be another advantage for smart edge devices.

This special issue of the IEEE Journal on Exploratory Computational Devices and Circuits (JXCDC) aims to call for the recent research progress of the NVM based neuromorphic computing from device-level, array-level up to system-level. The interaction and co-optimization between materials/device engineering and circuit/architecture is solicited.

Topics of Interests

Prospective authors are invited to submit original works and/or extended works based on conference presentations on the topics from a wide range of NVM based neuromorphic computing. Here the NVM devices include but not limit to the following: PCM, RRAM/CBRAM, STT-MRAM (or other spintronic memory), ferroelectric based memory including FeFET or Ferroelectric Tunnel Junction (FTJ), floating-gate or charge-trap transistor, NOR and NAND Flash, etc. The following topics are solicited:

- NVM materials/devices for neurons
- NVM materials/devices for synapses
- Selector materials/devices for crossbar array for analog in-memory computation
- Array-level demonstration for analog in-memory computation
- NVM based inference engine design including peripheral circuitry
- NVM based training accelerator design including peripheral circuitry
- Architectural-level design for processing-in-memory or compute-in-memory with NVM
- Brain-inspired spiking neural networks with NVM
- Hardware-aware neuromorphic learning algorithms and architectures
- Benchmarking tools for NVM based hardware accelerator design

Important Dates

Open for Submission: August 1st, 2018
Submission Deadline: December 1st, 2018
First Notification: January 10th, 2019
Revision Submission: February 10th, 2019
Final Decision: March 10th, 2019
Publication Online: April 1st, 2019

Submission   **Guidelines**

The IEEE Journal on Exploratory Solid-State Computational Devices and Circuits

(JXCDC) IS AN OPEN ACCESS ONLY PUBLICATION: Charge for Authors: $1,350 USD per paper. Paper submissions must be done through the ScholarOne Manuscripts website: https://mc.manuscriptcentral.com/jxcdc

Guidelines for papers and supplementary materials, as well as a paper template, are provided at this website (also on the next page).

Inquiries for the JxCDC Journal should be sent to: JXCDC@IEEE.ORG

JxCDC is sponsored by; Solid-State Circuits Society, Magnetics Society, Circuits & Systems Society, Nanotechnology Council, Computer Society, Electron Devices Society, Council on Electronic Design Automation, Council on Superconductivity.

Call for Papers - **IEEE Transactions on Nanotechnology (TNANO) Special Section/Issue on the 18th IEEE International Conference on Nanotechnology (IEEE-NANO 2018)**

Nanoscience and nanotechnology have rapidly established themselves as enabling disciplines within many disciplines including materials science, engineering, physics, chemistry, and biology. Following the success of the 18th IEEE International Conference on Nanotechnology (IEEE-NANO2018), IEEE Transactions on Nanotechnology (TNANO) is extending a Call For Papers for a Special Section /Issue reflecting the scope of the conference. Submitted manuscripts will undergo a full peer review process. Submissions are welcome but limited to NANO presentations. Authors who are attendees are requested to significantly expand the previous conference version to contain substantial new technical material, as per TNANO and IEEE restrictions on duplicated publications and the competitive acceptance process. Manuscripts for the TNANO Special Issue/Section must be submitted on-line using the IEEE TNANO manuscript template and "Information for Authors", via the IEEE Manuscript Central. On submission to TNANO, authors should select the "Special Issue" manuscript type instead of "Regular Paper."

Submissions that reflect the Conference Scope and current state of the field are welcome in areas including:

- Micro-to- nano-scale bridging
- Nanobiology and Nanomedicine

- Nanoelectronics
- Nanomanufacturing and Nanofabrication
- Nano Robotics and Automation
- Nanomaterials
- Nano-optics, Nano-optoelectronics, and Nanophotonics
- Nanopackaging
- Nanoscale Metrology and Characterization
- Nanofluidics
- Nanomagnetics
- Nano/Molecular Heat Transfer & Energy Conversion
- Nano/Molecular Sensors, Actuators, and Systems
- Nanotechnology Safety, Education and Commercialization

Important Dates:

- **Submission of papers:** 1 December 2018
- **Notification of first review results:** 1 March 2019
- **Submission of revised papers:** 15 April 2019
- **Notification of final review results:** 15 May 2019

Upcoming Conferences

The 12th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE NANOMED 2018) will be held at the Waikiki Beach, Hawaii, USA from Dec 2-5, 2018. IEEE NANOMED is one of the premier annual events organized by the IEEE Nanotechnology Council to bring together physicians, scientists and engineers in the area of Nano/Molecular Medicine and Engineering. The conference provides a unique forum for highlighting the latest research results in molecular engineering, microfluidics, nanotechnology, system integration, fundamental biology, and translational medicine.

The 12th IEEE Int. Conf. on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2018) is now calling for submission of your latest research results for possible dissemination in the conference. You may now submit your 2 pages abstract or 4-6 pages of Full Paper(s) to the conference submission page: https://www.softconf.com/i/nanomed2018. The submission deadline for late-news articles is Sept 15th, 2018.

Venue

The conference will be held at Sheraton Waikiki. The designated hotel for the IEEE NANOMED 2018 conference is Sheraton Princess Kaiulani, which is 600 meters walk away from Sheraton Waikiki conference hotel.

Publication

Authors may choose to submit a 4 to 6 page full paper (in IEEE conference paper format) by 31 October 2018 for inclusion in the IEEE Xplore database. (http://ieeexplore.ieee.org).

Special Issues of IEEE-NANOMED 2018. Selected papers presented at IEEE-NANOMED 2018 will be invited to publish in special issues of the peer-reviewed Molecules, An Open Access Journal from MDPI (IF 3.098) and SLAS Technology, Translating Life Sciences Innovation (IF 2.632).

Important Dates:

31 August 2018	Early bird registration
15 September 2018	Late-news abstract submission for review
30 September 2018	Notification of acceptance of late-news abstract
15 October 2018	Late-news final full paper submission (for Xplore publication)

IEEE NANO 2019

The 19th IEEE International Conference on Nanotechnology comes to Macau, China, from 22 to 26 July 2019. In addition to the traditional IEEE NANO session topics, the thematic focus for this year's event is Nano-Enabled Smart Things, including topics such as:

- DNA Nanotechnology
- Micro-to-nano-scale Bridging
- Nanobiology and Nanomedicine
- Nanoelectronics
- Nanomanufacturing and Nanofabrication
- Nano Robotics and Automation
- Nanomaterials
- Nano-optics, Nano-optoelectronics and Nanophotonics
- Nanofluidics
- Nanomagnetics
- Nano/Molecular Heat Transfer & Energy Conversion
- Nanoscale Communication and Networks
- Nano/Molecular Sensors, Actuators and Systems

IMPORTANT DATES

Deadline for abstract submission:	15 February 2019
Notification of acceptance:	15 April 2019
Deadline for final submission:	15 May 2019
Deadline for early bird registration:	15 June 2019

We look forward to welcoming you to IEEE NANO 2019!
For more details visit: https://2019.ieeenano.org/.

The 14th International Conference on Nano/Micro Engineered and Molecular Systems (NEMS) will be held from 11-14 April 2019 in Bangkok, at Marriott Marquis Queen's Park, Thailand.

The IEEE-NEMS is a premier conference series sponsored by the IEEE Nanotechnology Council focusing on the promotion of advanced research areas related to MEMS, nanotechnology, and molecular technology. Prior conferences were held in Singapore (2018), Los Angeles (USA, 2017), Matsushima Bay and Sendai (Japan, 2016), Xi'an (China, 2015), Hawaii (USA, 2014), Suzhou (China, 2013), Kyoto (Japan, 2012), Kaohsiung (Taiwan, 2011), Xiamen (China, 2010), Shenzhen (China, 2009), Hainan Island (China, 2008), Bangkok (Thailand, 2007), and Zhuhai (China, 2006). The IEEE-NEMS Conference typically attracts over 600 attendees with participants from more than 20 countries and regions worldwide.

Conference Scope

We invite contributions describing the latest scientific and technological research results in subjects including, but not limited to:

- Micro/Nano Electro-Mechanical Systems (M/NEMS)
- Micro/Nano/Molecular Fabrication
- Nanomaterials
- Nanomaterial Based Devices and Systems
- Nanophotonics and Nanoscale Imaging
- Nanoscale Robotics, Assembly, and Automation
- Molecular Sensors, Actuators, and Systems
- Micro/Nano Fluidics
- Micro/Nano Mechanics
- Nanobiology/Nanomedicine

IMPORTANT DATES

15 October 2018:   2-page abstract submission
01 December 2018: Notification of paper acceptance
15 January 2019:   Final full paper submission (for IEEE Xplore database)
For more details visit: https://ieee-nems.org/2019/.

MARSS
International Conference on Manipulation,
Automation and Robotics at Small Scales

MAR**SS** 2019
HELSINKI

Helsinki, Finland
July 1 – 5, 2019

MARSS, the 4th International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) is held from 01-05 July 2019 in Helsinki, Finland http://marss-conference.org/. General Chairs: Quan Zhou (FI) and Pasi Kallio (FI), Program Chairs: Just Herder (NL), Ronald Pelrine (US), and Yuen Kuan Yong (AU). This annual conference is managed by a high-level Steering Committee and technically supported by IEEE-RAS and IEEE-NTC. The conference has the ambition to be the flagship forum for cross-disciplinary R&D communities to discuss current activities related to manipulation and automation (including measurement and characterization) at micro and nano scales as well as to all kinds of small scale robots and their applications.

We cordially invite you to attend and contribute to the conference http://marss-conference.org/d…/MARSS2019_Call-for-Papers.pdf. The conference offers several keynote talks, about 12-15 plenary talks and parallel technical sessions (oral presentations only). Full or short papers on MARSS-related topics are invited, see details at http://marss-conference.org/submission/paper-submission. All presented full papers will be included into IEEE Xplore and indexed by Ei. The expected number of participants is about 220-250.

Please consider organizing a Special Session at MARSS2019. You may check http://marss-conference.org/submis…/special-session-proposal for details. Organizer(s) of a Special session (at least 5 registered presentations required) will benefit from appreciation allowance.

Submission of full or short papers: 1 February 2019
Special session proposals: 1 February 2019

T-NANO Best Paper Awards-2017

At the beginning of each year, T-NANO selects a paper that appeared in the Transactions during the previous calendar year for its Best Paper Award. Candidate papers are nominated by members of the Editorial Board. Evaluation is done by members of the Senior Editors Panel, with criteria including technical merit, originality, potential impact on the
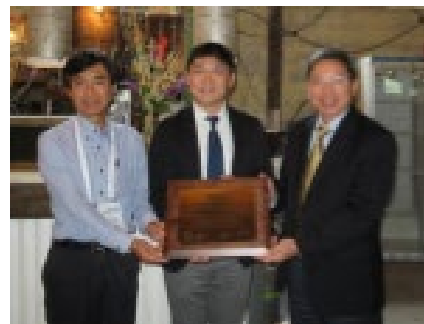
field, clarity of presentation, and practical significance for applications.

The winner of the 2017 TNANO Best Paper Award is **Negative Capacitance for Boosting Tunnel FET performance** by Masaharu Kobayashi; Kyungmin Jang; Nozomu Ueyama; and Toshiro Hiramoto, Institute of Industrial Science, University of Tokyo, Tokyo, Japan. To read the paper go to https://ieeexplore.ieee.org/document/7833118/.

Profs. Toshiro Hiramoto and Masaharu Kobayashi of The University of Tokyo accepting the TNANO 2017 Best Paper Award from NTC President Tzeng (right) at IEEE-NANO 2018 banquet.

National Nanotechnology Day - 2018

National Nanotechnology Day is an annual celebration in the US featuring a series of community-led events and activities on or around October 9 to help raise awareness of nanotechnology. This date, 10/9, pays homage to the nanometer scale, 10^{-9} meters.

The theme for this year's National Nanotechnology Day is "Nano in Motion," highlighting the dynamic progress of nanotechnology.

Click the link in Nano.gov to know more about the planned activities for National Nanotechnology Day:

Activities underway for National Nanotechnology Day 2018 can be found here.

IEEE—Nanotechnology Council's Social Media:
Official Facebook page

Dear friends,

I am elated to welcome you all to our official IEEE Nanotechnology - Facebook page. This group serves as a dedicated platform for researchers all over the world to connect and communicate nanotechnology and nano science. Now the IEEE Nanotechnology FB group has very rich contents with active interactions among members from around the world. *There are currently more than 13,000 members.*

I strongly encourage the group members to actively take part in promoting research and development in addition to other valuable information such as conference details and science jobs. Please feel free to join the group and add your fellow research members in order to expand the scientific network.

Thank you for your kindly support.

Warm Regards,
Jr-Hau He
Newsletter EIC of IEEE NTC
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IEEE NTC Has the Following Opportunities Available:

- [Call for 2019 DLs - extended to 31 October](#)
- [Call for Proposals for IEEE NANO 2021and NMDC 2020 - extended to 2 November](#)
- [Request for Proposals - 2019 Summer School on Nanotechnology](#)
- [2018 1st International Symposium on Micro/Nano Sensors for Healthcare and Smart City](#)

Call for Journal papers:

- [IEEE Transactions on Nanotechnology (TNANO) Special Section/Issue on the 18th IEEE International Conference on Nanotechnology (IEEE-NANO 2018)](#)
- [IEEE Transactions on Nanotechnology (TNANO) Special Section/Issue on the 13th IEEE Nanotechnology Materials and Devices Conference (IEEE 2018 NMDC)](#)
- [IEEE Journal on Exploratory Solid-State Computational Devices and Circuits - Special Issue on Nonvolatile Memory for Efficient Implementation of Neural/Neuromorphic Computing](#)

Deadlines extended to 2 November

IEEE NANO 2021:

The annual IEEE International Conference on Nanotechnology is the NTC's flagship event. The conference scope covers a wide range in nanoscience and technology. In particular, it covers nanofabrication, nanomanufacturing, nanomaterials, nanobiomedicine, nanoenergy, nanoplasmonics, nanoelectronics, nanosensors and nanoactuators, characterization and modeling of nano structures and devices. Research in both experiments and simulation is reported. Industry is encouraged to present its research projects. NANO 2018, 2019 and 2020 will be held in Cork, Ireland; Macau, China; Montreal Canada respectively.

We are now seeking proposals for **NANO 2021** which is expected to run in IEEE Regions 8 (Europe). NANO should be run at the end of July, preferably in the last week.

Candidates for NANO 2021 will be expected to present their proposal at the November NTC ExCom meeting. (The presentation can be done remotely, online.)

Proposal deadline: ***(extended)***

- NANO 2021: ***2 November 2018***

Submit proposals or indications of interest using the format outlined [here](#).

IEEE NMDC 2020:

The Nanotechnology Materials and Devices Conference (NMDC) aims to develop a critical assessment of existing work and future directions in nanotechnology research from every sector in the nanotechnology research field, with a special focus on materials and devices. NMDC 2018 and 2019 will be held in Portland, Oregon USA, and Stockholm, Sweden respectively. Past locations of the NMDC have been in Asia (Korea, Japan, Taiwan, Singapore), USA (California, Michigan, Hawaii, Alaska), and Europe (Sicily, France).

For conference history see http://www.ieeenmdc.org/

Candidates for NMDC 2020 will be expected to present their proposal at the November NTC Excom meeting. (The presentation can be done remotely, online.)

Proposal deadline: ***(extended)***

- NMDC 2020: *2 November 2018*

Submit proposals or indications of interest using the format outlined here.

Proposals must be e-mailed prior to the appropriate deadline to NTC Vice-President for Conferences Guangyong Li, (GUL6@pitt.edu) with copies to Ed Perkins, NTC Secretary (e.perkins@ieee.org).

Request for proposals for the 2019 IEEE Summer School on Nanotechnology

History: The IEEE Nanotechnology Council (http://ieeenano.org/about) sponsored its first Summer School Program on "Regenerative Nano-Medicine: From Advanced Delivery Systems to Electronic-Based Devices" at Tel-Aviv University, Israel, in June 2016. In the next years, Summer / Fall schools have focused on "N3: Nanomaterials, Nanotools, and Nanodevices" [Montreal, Canada], "Nanoelectronic technologies and devices: From basic principles to highly reliable applications" [Toulouse, France], "Nanotechnology: From Science to Systems and Beyond" [Bangalore, India], and "Nanotechnology for Energy" [Portland, USA]. These schools have been highly successful in educating and training a multinational audience of students, post-docs, and other early career researchers in their chosen topical area. Through this current announcement, the council seeks to continue this important initiative into its fourth year.

Call for proposals and its thematic areas: The IEEE Nanotechnology Council (NTC), in partnership with member societies of NTC, the Electron Devices and the Circuits and Systems societies ([EDS](EDS) and [CAS](CAS)), is requesting proposals for its Sixth Summer School. The school is expected to maintain an educational focus on nanotechnology, which may range from fundamentals in nanomaterials, nanofabrication and nano-characterization to diverse application areas such as nanosensors, nanoactuators, nanobiology and nanomedicine, nano-optics, nanorobotics, nanobiology, nanoelectronics, nanophotonics, DNA nanotechnology, nanomanufacturing, nanopackaging, nanofluidics, nanomagnetics, nano/molecular heat transfer & energy conversion, nanoscale communication and networks, nano/molecular sensors, actuators, and systems, and spintronics.

The Summer School may address the needs of a diverse target audience involving senior undergraduates, graduate students, post-docs, researchers and practitioners at the early stages of their careers, who are eager to broaden and/or deepen their skills in nanoscience and nanotechnology. Based on the success of the Summer School initiatives over the preceding years, it is expected that the attendance at the school will be around 50 participants.

The schools are expected to deliver **highly differentiated programs** in their chosen topical area with content delivered by **global leaders and thinkers** from academia, industry, and/or research laboratories. The schools may design a program that either:

(i) introduces a broad field to a target audience that is new to the topic and has no prior background, or
(ii) offer an in-depth training on a specialized topic such as nano-energy or graphene electronics to a target audience with some prior introduction to the chosen area.

While proposals are encouraged to design programs in either aspect, the **primary goal** in both cases must be to educate, train and raise awareness among next-generation researchers / academicians to technological advances, societal impacts, and career avenues in these rapidly evolving fields, and to foster participation in the adventure of research that will lead to the next generation of nanopioneers.

***Dates and Length*:** The **sixth IEEE Summer School on Nanotechnology will be held in the summer of 2019**. We expect the summer school to be offered every year thereafter, subject to continued availability of funding. The summer school is anticipated to involve a **5-day program**, although slightly longer or shorter durations may be acceptable in certain cases.

Important Dates:

- Eligible period: **May to September 2019**
- Deadline for submitting the proposal: **30 November 2018**
- Notification of the outcome of the review process: **31 December 2018**

To find out more and how to submit a proposal, see the announcement *here*.

2018 1st International Symposium on Micro/Nano Sensors for Healthcare and Smart City

Date: December 10, 2018
Location: Hong Kong
Sponsors: Hong Kong Science and Technology Parks Corporation; IEEE Nanotechnology Council

Call for papers/presentations:
In a time when businesses and consumers are increasingly looking to translate the physical world into digital format, the proliferation of small, durable and sophisticated sensors is playing an expanding role in robotics, artificial intelligence, IoT, electronics, and healthcare

applications. Significant progress in MEMS and Nanotechnology have enabled the manufacturing of a new generation of sensors, which opened up a whole host of markets and opportunities yet to be fully explored.

This symposium will bring together global professionals from academia and industry to discuss the latest emerging sensor technologies and how innovative sensors and sensing solutions can be applied to real-life applications.

This symposium will highlight:

- Emerging sensor technologies
- Applications of intelligent sensing devices for robotics, artificial intelligence, IoT, electronics, healthcare, and other new areas
- Challenges and opportunities for the sensor industry

Any questions, please contact the conference organizer candy.cheng@hkstp.org