



IEEE NANO

8-11 July | **2024**
gijón, Spain



TECHNICAL PROGRAM



Nanotechnology Council®

visita **gijón**
Convention Bureau

Technical Program

24th IEEE International Conference on Nanotechnology (IEEE NANO 24)
8th to 12th July 2024, Gijón – Spain

Editors:

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José Carlos Martínez-García

**This is an open access book, available from
<https://2024.ieeenano.org/technical-booklet/>**

WELCOME



WELCOME TO IEEE NANO 2024

ON BEHALF OF THE IEEE NANOTECHNOLOGY CONFERENCE

Initially launched in 2001, IEEE-NANO is the flagship conference series of the IEEE Nanotechnology Council, focusing on promoting advanced research in nanoscience and nanotechnology. It has brought together world-class engineers and scientists from all over the world and every sector of the academy and industry, enabling the exchange of the latest advances in basic and applied research in nanoscience and nanotechnology. Recent IEEE-NANO conferences were held in Jeju Island (Korea, 2023), Palma de Mallorca (Spain, 2022), Montreal (Virtual; Canada, 2021), Virtual (2020), Macau (China, 2019), Cork (Island, 2018), Pittsburgh (USA, 2017), Sendai (Japan, 2016), and Rome (Italy, 2015).

Welcome from the Conference Chairs to IEEE NANO 2024

As you browse this program book, the interest and enthusiasm with which the Organizing Committee has prepared IEEE NANO 2024 should be evident.

We have tried to make everything perfect so you can enjoy great scientific talks and your colleagues' company in a wonderful atmosphere.

We have dedicated three years to this project, becoming a cohesive team committed to one goal: making IEEE NANO unforgettable.

And now you are here. We hope you like everything we have prepared for you. Let's enjoy another IEEE NANO together!

Montserrat Rivas, Conference General Chair
Kremena Makasheva, Conference Co-chair
Valentyn Novosad, Conference Co-chair

WELCOME FROM THE PROGRAM COMMITTEE CHAIR

It has been a great honor to serve as program chair of the IEEE International Conference on Nanotechnology 2024 - IEEE NANO 2024 - conference, and for this, I am very grateful to the conference chair and co-chairs, especially Montserrat. I greatly appreciate the support of two program co-chairs, **Vito and Jia Yan**, for their help implementing all the work necessary to organize a great program for the nanotechnology community. In particular, this has been possible thanks to the work in collaboration with all the Technical Committees chairs and members of the IEEE Nanotechnology Council, which were responsive and positive in their actions.

As we gather in this vibrant coastal city known for its rich cultural heritage and innovation, we are set to embark on an intellectual journey exploring nanoscience and nanotechnology. The conference offers an opportunity to explore nanoscience and nanotechnology, featuring 6 plenary and 6 keynote lectures, 25 special invited sessions, and 18 technical sessions, as well as workshops and poster presentations addressing pressing challenges and exploring future frontiers in the field of nanotechnology.

Don't miss the chance to network, exchange ideas, and forge collaborations. Welcome to Gijón and the IEEE International Conference on Nanotechnology 2024! Let's make this an unforgettable experience.

Giovanni Finocchio, Program Chair

OUR MOTTO : AN EXTENDED BRIDGE TO LATIN AMERICA

The motto for IEEE NANO 2024, "An extended bridge to Latin America", reflects our commitment to fostering inclusivity and knowledge exchange across borders. As part of this initiative, we are hosting a tutorial session with invited speakers delivering their presentations in Spanish and Portuguese. The session will be streamed online, allowing students from across Latin America to participate, and live subtitled in English. This approach exemplifies our dedication to creating a bridge for knowledge and collaboration, uniting the scientific community in a spirit of diversity and cooperation. Our idea is to facilitate Latin-American student's attendance and, at the same time, make native English speakers aware of the difficulties that such students face in their scientific path. Moreover, the talks are aligned with at least one of the UN Sustainable Development Goals.

The LATAM Special Session will be held in the beautiful building of the Laboral Ciudad de la Cultura of Gijón, on Monday afternoon.

José Miguel García-Martín, Motto Activities Chair

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María Salvador Fernández	<i>University of Oviedo</i>	<i>Spain</i>
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Kanika Singh	<i>IETE Fellow IEEE NTC</i>	

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USEFUL INFORMATION

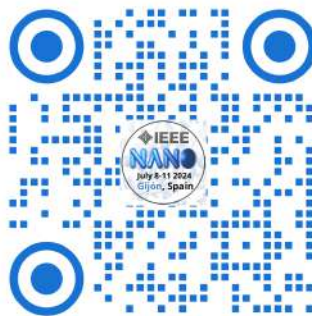
Photo Policy for the Congress: We encourage attendees to capture memorable moments during the congress. However, please refrain from taking photos of the speakers and their presentations, as some of the results presented may be confidential. If you are interested in the presentation slides, please feel free to approach the speaker directly to request them. Thank you for your understanding and cooperation in maintaining the integrity of the shared research.

We'd be happy to share your photos and posts if you tag us on the conference social media and use the official hashtag **#NANO24**.



WHOVA APP

A comprehensive event management experience that allows you to create and manage your personal agenda, navigate multiple tracks and sessions, share and connect with other participants and keep you informed of important announcements and changes. You should have received an invitation to download it in the email you registered with. But if not, you can download the Whova app by scanning this QR code! Please, check before to avoid duplicated profiles.



EMERGENCY USEFUL INFORMATION

Telephone Numbers of Interest

Cabueñes Hospital: 985 185 004 | Begoña Hospital: 985 367 711 | Local Police: 092 | National Police: 091 | Gijón Tourist Information: 985 341 771

24-Hour and On-Call Pharmacies in Gijón:

Paseo de Begoña, nº 7 (next to the Jovellanos Theater) | Avenida del Llano, 57

VENUE

The **IEEE NANO 2024** will be held from July 8 to 12, with the main scientific conference taking place from July 9 to 11 at the Feria de Muestras FIDMA in Gijón, while Monday's program and Friday's workshops will be held at Laboral Ciudad de la Cultura.



LABORAL CIUDAD DE LA CULTURA

C. Luis Moya Blanco, 261, 33203
Gijón, Asturias

MONDAY AND FRIDAY PROGRAM



FERIA DE MUESTRAS FIDMA

Paseo Dr. Fleming, 481, 33201
Gijón, Asturias

Tuesday 9 - Thursday 11
(Scientific Program)

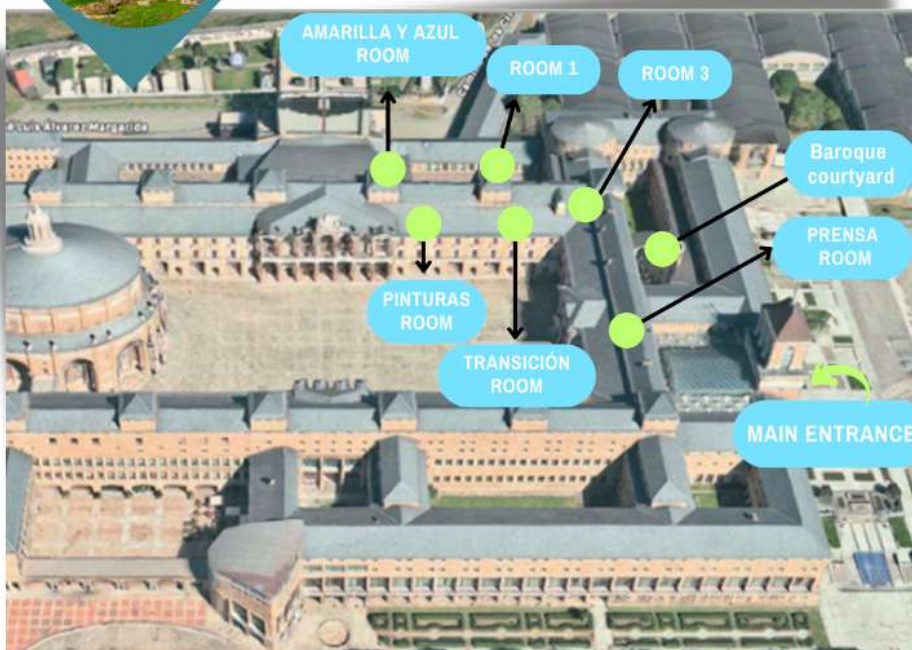
LABORAL CIUDAD DE LA CULTURA

Monday 8 & Friday 12

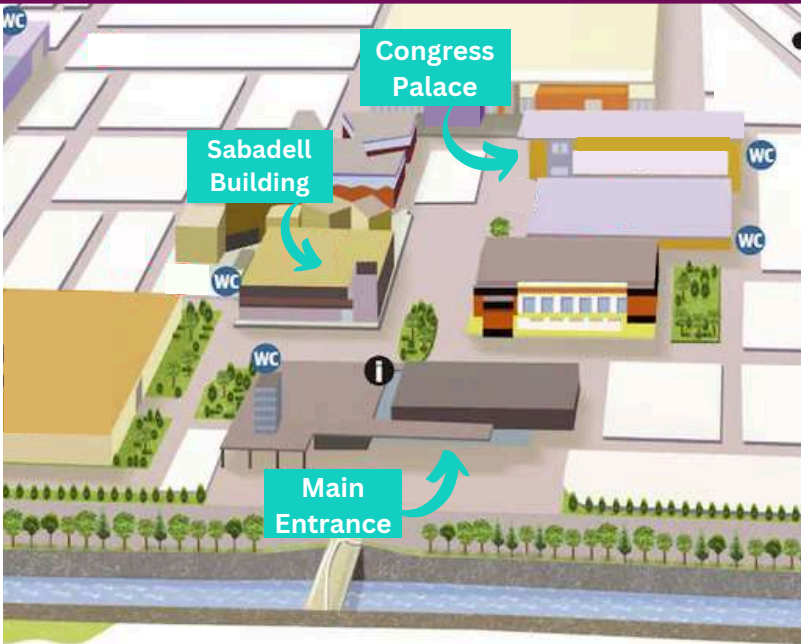


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Line 1, 2 and 18

Book a taxi
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PALACIO DE CONGRESOS & SABADELL



Tuesday 9 - Thursday 11
(Scientific Program)

Feria de Muestras FIDMA.
Paseo Dr. Fleming, 481,
33201 Gijón, Asturias

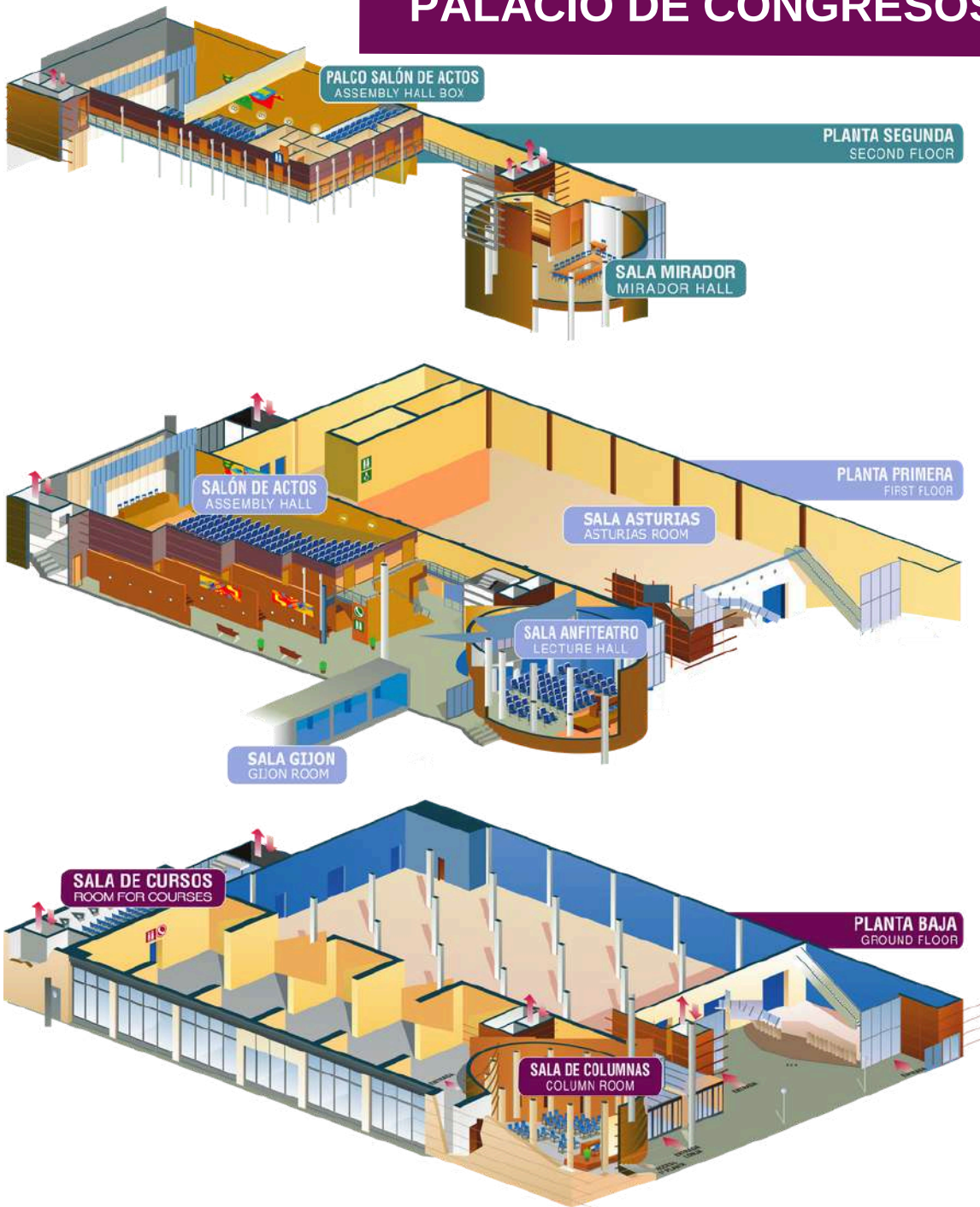


"Gijón Las Mestas"
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PALACIO DE CONGRESOS (details)



PROGRAM

PROGRAM OVERVIEW

START TIME	MONDAY	START TIME	TUESDAY	WEDNESDAY	THURSDAY	START TIME	FRIDAY
		8:40	Opening				
9:00	Intro Tutorials Session	9:00	Plenary : Salvador Pané i Vidal	Plenary : Tony Heinz	Plenary : Ravi Mahajan	9:30	Workshops
9:20	Tutorial 0	9:50	Keynotes : Zenghui Wang Angelo Sampaolo	Keynotes : Khalili Amiri Pablo Alonso González	Keynotes : Xinran Wang Jin-Woo Kim		
10:10	Tutorial 1	10:20	Coffee Break + Posters A1	Coffee Break + Posters B1	Coffee Break + Posters C1		
11:00	Coffee						
11:20	Tutorial 2	11:20	Parallel Sessions	Parallel Sessions	Parallel Sessions		
12:10	Tutorial 3						
12:35	Lunch	13:20	Lunch	Lunch	Lunch		
14:15	Tutorial 4	14:50	Plenary : Rosa Menéndez	Plenary : María Vélez Menéndez	Plenary : Shesha S. Raghunathan		
15:20	Tutorial 5	15:35	Coffee Break + Posters A2	Coffee Break + Posters B2	Coffee Break + Posters C2		
16:00	LATAM 1	16:35	Parallel Sessions	Parallel Sessions	Parallel Sessions		
16:50	LATAM 2						
17:30	Coffee Break						
18:00	LATAM 3	18:15			Closing Ceremony	18:00	
18:40	LATAM 4	18:30	WiN Event		NanoXpress		
19:00	Registration and Welcome Party	19:00		Conference Dinner			
		20:00	Young Professionals Special Event				

Tutorials Special Session

Dive into the exciting world of nanoscience and nanotechnology at the dedicated Tutorial Session of the IEEE NANO 2024. This unique opportunity, designed exclusively for students and young professionals seeking invaluable insights into these cutting-edge fields, offers a dynamic platform for participants to interact with experts from around the globe.



TO: MARIAGRAZIA GRAZIANO & YURI ARDESI, POLITECNICO DI TORINO (ITALY)

MODELLING MOLECULAR PHYSICS IN FIELD COUPLING NANOCOMPUTING

T1: PROF. WINNIE YE, CARLETON UNIVERSITY (CANADA)

SILICON PHOTONICS - THE LATEST RESEARCH TRENDS AND INDUSTRIAL APPLICATIONS



T2: F. PELAYO GARCÍA DE ARQUER, ICFO (SPAIN)

MATERIALS AND SYSTEM ENGINEERING IN WATER AND CO₂ ELECTROLYSIS

T3: PROF. M. P. ANANTRAM, UNIVERSITY OF WASHINGTON (USA)

DNA NANOSTRUCTURES - INSIGHTS FROM ELECTRICAL MODELING



T4: GERHARD KLIMECK, PURDUE UNIVERSITY (USA)

COMMUNITY BUILDING ON CHIPSHUB.ORG POWERED BY NANOHUB.ORG



T5: PROF. G.E. JABBOUR, UNIVERSITY OF OTTAWA (CANADA)

NANOMATERIALS VIA GREEN MANUFACTURING APPROACHES USING REACTIVE COATING AND PRINTING



Monday 8



Laboral Ciudad de la Cultura, Gijón

AN EXTENDED BRIDGE TO LATIN AMERICA

The motto for IEEE NANO 2024, “An extended bridge to Latin America”, reflects our commitment to fostering inclusivity and knowledge exchange across borders. As part of this initiative, we are hosting a tutorial session with invited speakers delivering their presentations in Spanish and Portuguese. These talks will be live-subtitled in English, facilitating seamless communication. The session will be streamed online, allowing students from across Latin America to participate. This approach exemplifies our dedication to create a bridge for knowledge and collaboration, uniting the scientific community in a spirit of diversity and cooperation



Diana C. Leitao

Department of Applied Physics and Science Education, Eindhoven University of Technology (TU/e), The Netherlands

Sensores magnéticos (PT)
Magnetic sensors (EN)

Franciscarlos Gomes da Silva

Instituto de Física, University of Brasília, Brazil

Nanopartículas para Biomedicina (PT)
Nanoparticles for Biomedicine (EN)



Isabel Díaz

Instituto de Catálisis y Petroleoquímica (ICP-CSIC), Spain

Zeolitas nanomodificadas para purificar el agua (ES)
Nano-modified zeolites to purify water (EN)



Jorge Luis Cholula-Díaz

School of Engineering & Sciences, Tecnológico de Monterrey, Mexico

Síntesis verde de nanoestructuras (ES)
Green synthesis of nanostructures (EN)



Monday 8



Laboral Ciudad de la Cultura, Gijón

TUESDAY 9TH OF JULY

8:40		Opening	Salón de Actos
9:00	Plenary Speaker	Salvador Pané i Vidal <i>Magnetic Microrobots for Biomedical Applications</i> ETH Zürich (Switzerland)	Salón de Actos
9:50	Keynote Speakers	Zenghui Wang Angelo Sampaolo	Salón de Actos Sala Anfiteatro
10:20		Poster Session A 1 and Coffee break	Sala Asturias
11:20		Parallel Sessions	
	SS25 I	Workshop on Nanotechnology for Computing I	Salón de Actos
	SS24 I	Electron and hole-based semiconductor qubit platforms I	Salón Anfiteatro
	TS9	Nanomagnetics	Sala Gijon
	SS19	Fundamentals and applications of photoconductivity in 2D materials	Sala Mirador
	SS13, TS18	Advancing Energy-Efficient Memory And Computing: Innovations In Devices And Circuits	Sala Columnas
	TS8, TS13	Nanofabrication and Nanopackaging	Sabadell 1
	SS5 I	Ion and Electron Transport in Bio-nanostructures I	Sabadell 2
13:20		Lunch	Sala Asturias
14:50	Plenary Speaker	Rosa Menéndez <i>Optimization of graphenic materials for environmental and energy applications</i> INCAR (Spain)	Salón de Actos
15:35		Poster Session A II and Coffee Break	Sala Asturias
16:35		Parallel Sessions	
	SS25 II	Workshop on Nanotechnology for Computing II	Salón de Actos
	SS24 II	Electron and hole-based semiconductor qubit platforms II	Salón Anfiteatro
	TS11, TS5	Nanometrology, Characterisation and Nanobiomedicine	Sala Gijon
	SS2	Silicon Photonics	Sala Mirador
	SS11	2D Spintronics	Sala Columnas
	TS16, TS15	Nanosensors & Nanoactuators, Nanoscale Communication	Sabadell 1
	SS5 II	Ion and Electron Transport in Bio-nanostructures II	Sabadell 2
18:30		Women in Nanotechnology Special Event	
20:00		Young professionals Special Event	

WEDNESDAY 10TH OF JULY

9:00	Plenary Speaker	Tony Heinz <i>2D semiconductors</i> Stanford University (USA)	Salon de Actos
9:50	Keynote Speakers	Pedram Khalili Amiri Pablo Alonso-González	Salon de Actos Sala Anfiteatro
10:20	Poster Session B I and Coffee break		Sala Asturias
11:15	Parallel Sessions		
	SS25 III	Workshop on Nanotechnology for Computing III	Salon de Actos
	SS4	Integrated Photonics for optical Computing and Communication	Salon Anfiteatro
	SS14, TS7	Nanostructures for extreme environments	Sala Gijon
	SS8	Advanced Modeling and Simulation of Plasma Processes for atomic scale precision semiconductor device fabrication	Sala Mirador
	SS21, SS22	Current Frontiers of Magnetic Nanotechnologies & Large Scale Techniques for Nanotechnology	Sala Columnas
	TS1, TS18	AI in Nanotechnology & Quantum Neuromorphics	Sabadell 1
	TS2, 7, 10	Nano-Energy, Environment and Safety & Nanomaterials Emerging Plasma Nanotechnologies	Sabadell 2
13:20	Lunch		Sala Asturias
14:50	Plenary Speaker	María Vélez Fraga <i>Nanoscale magnetic textures in 3D: X-ray vector tomography and applications</i> University Oviedo (Spain)	Salon de Actos
15:35	Poster Session B II and Coffee Break		Sala Asturias
16:35	Parallel Sessions		
	SS25 IV	Workshop on Nanotechnology for Computing IV	Salon de Actos
	SS3	Nanophotonics and Plasmonics	Salon Anfiteatro
	SS10, SS17	MXenes in Biomedicine, New Frontier in Mechanical to Electric Power Conversion	Sala Gijon
	SS23, TS17	Nanotechnology for Soft Electronics (I)	Sala Mirador
	SS15	Quantum Transport for Next- Generation Devices	Sala Columnas
	SS6	Chipllets, a path to more than Moore	Sabadell 1
	SS12	Nanodevices for Biomedical Applications	Sabadell 2
19:00	Conference Dinner + Awards		Palacio de La Riega

THURSDAY 11TH OF JULY

9:00	Plenary Speaker	Ravi Mahajan <i>Advanced packaging technologies for heterogeneous integration (HII)</i> <i>Intel Corporation (USA)</i>	Salón de Actos
9:50	Keynote Speakers	Xinran Wang Jin-Woo Kim	Salón de Actos Sala Anfiteatro
10:20	Poster Session C I and Coffee break		Sala Asturias
11:15	Parallel Sessions		
	TS5, TS10	Nanobiomedicine & Nanomaterials	Salón de Actos
	SS1	Hydrophobic, oleophobic and icephobic Nanostructured Surfaces	Salón Anfiteatro
	SS7	Advanced low Power open and neuromorphic Architectures	Sala Gijon
	SS16, TS9, TS10	0-2D Nanomaterials & Nanomagnetism & Nanomaterials	Sala Mirador
	TS4, TS12	Nano-acoustic Devices, Processes and Materials & Nano-optics, Nanophotonics	Sala Columnas
	TS18, TS19	Spintronics & Neuromorphic Computing	Sabadell 1
	SS9, TS9	Field-Coupled Nanocomputing, Nanomagnetism	Sabadell 2
13:20	Lunch		Sala Asturias
14:50	Plenary Speaker	Shesha S Raghunathan <i>Quantum Computing: what, why and what next?</i> <i>IBM (USA)</i>	Salón de Actos
15:35	Poster Session C II and Coffee Break		Sala Asturias
16:35	Parallel Sessions		
	TS10	Nanomaterials	Salón de Actos
	TS6	Nanoelectronics	Salón Anfiteatro
	TS3, TS14	Modeling and Simulation & Nanorobotics and Nanomanufacturing	Sala Gijon
	SS23	Nanotechnology for Soft Electronics (II)	Sala Mirador
	SS20	Emerging Nanotechnology Approaches for 3D neuromorphic electronic Devices	Sala Columnas
	SS18	Bridging Gaps : Advancing Single-Molecule Electronics in Electronics Engineering	Sabadell 1
18:15	Closing		Sala Asturias

PLENARY SPEAKERS

Salvador Pané i Vidal
ETH Zürich (Switzerland)



SHORT BIO

Salvador Pané i Vidal is a Professor of Materials for Robotics at the Institute of Robotics and Intelligent Systems (IRIS) and Co-Director of the Multi-Scale Robotics Lab at ETH Zürich. He obtained his PhD in Chemistry from University of Barcelona (UB). With over 170 publications in international peer-reviewed journals and educational books, Pané's current focus is on integrating chemistry and electrochemistry with the field of small-scale robotics. Particularly, Pané specializes in miniaturizing magnetic materials, conductive polymers, and smart materials for targeted drug delivery. Prof. Pané has been coordinator and PI of several EU projects (including FET Open, FET Pro-active, EIC Open), and has been awarded with an ERC Starting Grant (2013) and a Consolidator Grant (2019). He has co-founded two startups, Magnes AG and Oxyle AG. In 2019, he received the Big-on-Small Award for his contribution in the field of micro- and nanorobotics. He was also granted an ERC Proof-of-Concept award in 2019.

MAGNETIC MICROROBOTS FOR BIOMEDICAL APPLICATIONS

We live in a world increasingly surrounded by robots such as robotic surgical systems, flying drones, autonomous planetary rovers, and robotic appliances. An emerging family of robotic systems are untethered micro- and nanorobots. These tiny vehicles can move in fluids by means of external energy sources such as light, ultrasound, magnetic fields or combinations of these. One of the ultimate goals of small-scale robotics is to develop machines that can deliver drugs or realize other medical missions in confined spaces of the human body. Other applications include water remediation or “on-the-fly” chemistry. The recent rapid developments in small-scale robotics is undeniably related to advances in material science and manufacturing. However, while many applications have been demonstrated, aspects such as complex locomotion, multifunctionality, biocompatibility and biodegradability need to be further investigated for the successful translation of these devices to real applications. To this end, new material-based concepts and novel fabrication schemes are urgently required. This talk will explore various material-based concepts and innovative fabrication techniques to address translational challenges and further enhance the field of small-scale robotics.

Rosa Menéndez

Instituto de Ciencia y Tecnología del Carbono,
INCAR (Spain)



SHORT BIO

Rosa María Menéndez López is an organic chemist who got her PhD from the University of Oviedo in 1986. She is a Research Professor at the Carbon Science and Technology Institute (INCAR-CSIC), in Oviedo, making significant contributions in the area of carbon materials. One of her recent lines of research has focused on the potential applications of graphene in biomedicine, energy storage, and environmental applications. She has worked at several universities in EU and USA. Prof. Menéndez served as President of the Spanish National Research Council CSIC (2017-2022), becoming the first woman to chair this institution. She also held the position of Director of INCAR (2003-2008.) She also served on advisory boards for the industrial sector, such as the multinational SASOL or NalonChem. Prof. Menéndez holds 9 patents and has received numerous awards, including the XIX DuPont Award, the Shunck Carbon Award, the Scientific Career Award from the Spanish Association of Materials, the Award for Chemical Excellence granted by the General Council of the Official Associations of Chemists of Spain, and the Silver Medal of the Principality of Asturias in 2019, among others. There is a street named after her in Oviedo.

OPTIMIZATION OF GRAPHENIC MATERIALS FOR ENVIRONMENTAL AND ENERGY APPLICATIONS

Carbon nanomaterials like graphene are prized for their excellent electrical conductivity, mechanical stability, and functionality, making them ideal for energy and environmental applications. However, high production costs limit large-scale use. To address this, sustainable alternatives such as graphite waste and biomass, which are low-cost and abundant, are being explored as carbon-neutral precursors. The main challenge lies in maintaining the quality of graphene from these heterogeneous materials. This study aims to produce graphene from coke and biomass wastes using environmentally friendly chemical procedures. The resulting graphene oxides (GOs) demonstrate suitable properties for applications in electrodes for oxygen evolution reactions (OER) and wastewater remediation. Additionally, GOs are used to develop inkjet-printed electrodes (IPEs) for detecting pharmaceutical contaminants in water, offering a promising alternative to traditional electrochemical sensors.

Tony Heinz
Stanford University (USA)



SHORT BIO

Tony Heinz is a Professor of Applied Physics and Photon Science at Stanford University, with a courtesy appointment in Electrical Engineering and a joint affiliation with SLAC National Accelerator Laboratory. Heinz received a BS degree in Physics from Stanford University in 1978 and a PhD degree, also in Physics, from the University of California at Berkeley in 1982. Heinz was subsequently at the IBM Research Division in Yorktown Heights, NY until joining Columbia University in 1995 as a Professor of Electrical Engineering and Physics. At Columbia, he served as a Scientific Director of the Columbia Nanoscale Science and Engineering Center (NSEC) and of the Energy Frontier Research Center (EFRC). He was also the President of Optica in 2012. Heinz joined Stanford University in 2015, also serving as the Director of the Chemical Sciences Division at SLAC from that time until 2019. From 2017 to 2022, he was the Associate Laboratory Director for Energy Sciences at SLAC. Heinz is known for his research into the properties and dynamics of nanoscale materials, particularly 2D materials, through the creative use of optical and laser-based techniques. He is a Fellow of several professional societies, including the IEEE, as well as the US National Academy of Sciences.

2D SEMICONDUCTORS

2D semiconductors, such as the transition metal dichalcogenides, exhibit robust and optically bright excitonic states. These states arise from the direct-gap character of the crystals at monolayer thickness and their reduced dielectric screening. We will review our understanding of such excited states, including the new characteristics that emerge through stacking layers of different semiconductors as heterostructures and the associated moiré effects present for slightly misaligned crystal lattices. We hope in this talk to explain some of the distinctive electronic and optical properties of these systems, as well as their potential for applications in optoelectronics and quantum information science.

María Vélez Fraga
University of Oviedo (Spain)



SHORT BIO

María Vélez pursued her studies at University Complutense in Madrid where she obtained her PhD in 1995. After a postdoctoral stay at University of California San Diego, she joined the Physics Department of University of Oviedo in 1998 where she is currently a Full Professor in Condensed Matter Physics. Her research interests have been centered in the study of vortex propagation in hybrid superconducting/magnetic systems and, more recently, in the study of magnetic textures at the nanoscale in multilayers and in patterned structures in collaboration with the group of Prof. Salvador Ferrer at ALBA Synchrotron.

NANOSCALE MAGNETIC TEXTURES IN 3D: X-RAY VECTOR TOMOGRAPHY AND APPLICATIONS

Spin textures in perpendicular magnetic anisotropy materials are key elements to understand magnetization reversal at the nanoscale and in the design of novel spintronic devices that go beyond planar architectures into the third spatial dimension. Recently, it has become possible to obtain precise 3D vector maps of the magnetization with nanoscale resolution by the development of advanced imaging techniques such as X-ray vector magnetic microscopy and tomography at ALBA Synchrotron. Here, we will show magnetic vector tomograms acquired in different magnetic multilayers and nanostructures with non-trivial magnetization profiles across the sample thickness, engineered by the interplay between exchange, anisotropy and magnetostatics. In this way, we are able to observe (i) 3D magnetic singularities (Bloch points) within domain walls and topological dipoles linked by magnetic vortices; (ii) domain walls across the sample thickness in a ferrimagnetic exchange spring; and (iii) the spatial segregation of hyperbolic and circulating Bloch points depending on the local exchange length in a multilayer. Finally, recent results on the propagation of meron spin textures under pulsed magnetic fields and electrical currents will also be presented.

Ravi Mahajan

High Density Interconnect Pathfinding, Intel Corporation (USA)



SHORT BIO

Ravi Mahajan is an Intel Fellow responsible for Assembly and Packaging Technology Pathfinding for future silicon nodes and represents Intel in academia through research advisory boards, conference leadership and participation in various student initiatives. He has led Pathfinding efforts to define Package Architectures, Technologies and Assembly Processes for multiple Intel silicon nodes including 90nm, 65nm, 45nm, 32nm, 22nm and 7nm silicon. Ravi joined Intel in 1992 after earning his Ph.D. in Mechanical Engineering from Lehigh University. He holds the original patents for silicon bridges that became the foundation for Intel's EMIB technology. Ravi is a Fellow of two leading societies, ASME and IEEE. He was elected to the National Academy of Engineering in 2022 for contributions to advanced microelectronics packaging architectures and their thermal management.

ADVANCED PACKAGING TECHNOLOGIES FOR HETEROGENEOUS INTEGRATION (HI)

Heterogeneous Integration (HI) is a powerful and crucial enabler for the continued growth of computing and communication performance. Advanced packaging technologies are critical enablers of HI because of their importance as compact, power efficient platforms. This talk will focus on the tremendous opportunities in different application environments and focus on the projected evolution of advanced packaging architectures. Interest in HI research has picked up in recent years and this opens up greater collaboration opportunities between academia and industry. Specific examples, showing how product implementations take advantage of currently available HI technologies, to provide an unprecedented level of performance, will be used to describe the challenges and opportunities in developing robust, next generation advanced package architectures. A broad scope roadmap of the future generated as part of an industry-academic collaboration will be discussed in this context to highlight the opportunities generated by HI. Opportunities in physical interconnect scaling, an important part of the HI Roadmap will be discussed in detail with a focus on processes to create fine pitch, high performance interconnects.

Shesha Raghunathan

IBM (USA)



SHORT BIO

Shesha Raghunathan joined IBM in 2011 and is currently Global Lead for Startup Ecosystem in IBM Quantum. He is responsible for all engagement touch points with quantum startups– including technology access, collaboration, go-to-market, networking opportunities. In his previous role, he was part of strategic partnership team in IBM Quantum that explored opportunities to engage with Governments/Research Labs on large deals. Prior to that, he was part of Electronic Design Automation (EDA) Timing analysis development team and worked on various aspect of analysis including noise, timing abstraction, reporting along with analytics and machine learning. Shesha got his PhD in Electrical Engineering (Quantum Computing) from University of Southern California, LA in 2010. His current research interests include near-term quantum algorithms, circuit optimization and quantum machine learning.

QUANTUM COMPUTING: WHAT, WHY AND WHAT NEXT?

Quantum computing is a fundamentally new model of compute that has the potential to have a wide impact across multiple businesses. The technology has been improving exponentially rapidly – a la Moore's law – and is projected to continue for foreseeable future. Also, IBM is committed to deliver 100×100 – generated unbiased expectation value for circuit that is 100 qubits wide and with depth 100 – by 2024. Newer algorithmic techniques like error mitigation are taking centre stage and it is hoped that they will lay the path to quantum advantage. In this talk, I will give an overview of what quantum computing is, what it offers, why should we care about it, and why now? I will also cover some of the use-cases that are being explored, provide a perspective on what class of problems are likely to achieve quantum advantage, and what we should we do to be quantum ready.

KEYNOTE SPEAKERS

Tuesday, July 9



Zenghui Wang

University of Electronic Science and Technology of China, China

The Sound of Music at the Nanoscale—Exploring the Nanoscale World with NEMS Resonators Based on Low-Dimensional Nanomaterials



Angelo Sampaolo

Politecnico di Bari, Italy

Piezoelectric mechanical resonators as sensitive elements for gas spectroscopy and sensing

Wednesday, July 10



Pedram Khalili

Northwestern University, Illinois, USA

New directions in nano-spintronics for sustainable and unconventional computing



Pablo Alonso González

University of Oviedo, Spain

Controlling light at the nanoscale with 2D materials

Thursday, July 11



Xinran Wang

Nanjing University & Suzhou Laboratory, China

2D semiconductors for future computing



Jin-Woo Kim

University of Arkansas, USA

Engineering Advanced Bio/Nano-Hybrid Materials for Nanobiotechnology Innovations

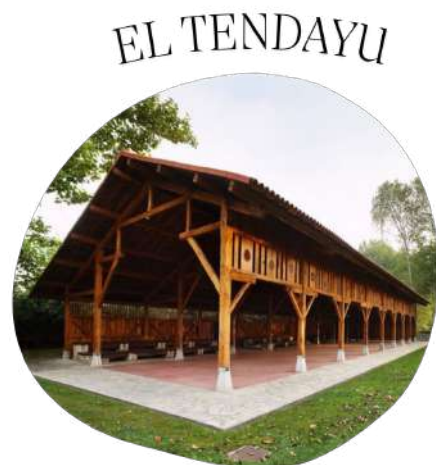
SOCIAL PROGRAM

There will be a full programme of social events at IEEE NANO 24, and delegates will be able to enjoy more than a glass of wine and a bottle of cider while greeting old and new acquaintances. These activities are included in IEEE NANO 24 registration fee. To help us organize it, please, send us an email to participate in case you did not check it when you registered: ieeenano2024@azulcongresos.com or drop by the registration desk.

WELCOME RECEPTION

We are happy to welcome you during the Welcome Reception on Monday Evening to enjoy the traditional atmosphere of a 'espicha'. See you at 19h!

Paseo Dr. Fleming, 877
33203 Gijón
Asturias



WOMAN IN NANOTECHNOLOGY: TOGETHER, WE WIN!

Aimed at promoting diversity, equity, and inclusion within the nanotechnology sphere, the IEEE NANO 2024 “Women in Nanotechnology” special event provides a space to connect with women at different stages of their careers, professionals working in academia and industry, and women leaders in nanoscience and nanotechnology. Be inspired by their stories, contribute to the collective advancement of the field and be part of a transformative dialogue shaping the future of nanoscience.

Attendees can expect engaging discussions on diverse subjects, including:

- **Leadership:** Discuss the role of women in leadership positions, driving innovation and progress in nanotechnology.

- **Including Gender Impact in Research Projects:** Discuss about strategies to integrate gender perspectives into research projects, enhancing their relevance and impact.
- **Women Mentorship:** Explore the significance of mentorship in the professional growth of women in nanotechnology.
- **Innovative Ways to Inspire the Young Generation in Nanotech:** Discuss creative approaches to encourage and inspire the next generation of women in the field.
- **Quotas:** Debate the role of quotas in promoting gender balance and diversity within the nanotech community.
- **Life in Industry:** Gain insights into the experiences and challenges faced by women in nanotechnology within the industrial landscape.
- **Life in Academy:** Explore the unique journeys of women contributing to nanotech in academic settings.

Don't miss this opportunity to expand your professional network!

YOUNG PROFESSIONALS NETWORKING EVENT

Embark on a journey of shared experiences and professional growth at IEEE NANO 2024's Young Professionals special event! Tailored for students and emerging talents in the dynamic fields of nanotechnology and nanoscience, this gathering provides a unique platform for networking and knowledge exchange in a relaxed and congenial atmosphere. **Engage with your peers facing similar challenges, share stories of triumphs and lessons learned, and forge connections that will extend beyond the event.** The Young Professionals event is a chance for you to contribute your perspectives and aspirations to the collective discourse of the nanotechnology community. Come join us for an evening of camaraderie, insights, and the chance to build lasting connections that will propel your career in nanotechnology forward. Young Professionals – where the future of nano begins.

NANO-SDC STUDENT DESIGN COMPETITION

This year IEEE NANO 2024 will host for the first time ever the first edition of the NANO Student Design Competition (NANO-SDC). The student design competitions are planned to be unique events that challenge the creativity, competitive spirit, and enthusiasm of the students. It is a joint initiative of the Young Professional and Educational Activities committees.

PARTICIPANTS OF THE NANO-SDC STUDENT DESIGN COMPETITION

- **"Hardware Implementation of a Signal Reconstruction System for an Integrate and Fire Neuron"**, Sasi Pujitha Ravipati, Srikari Sritkantham, Binsu Kailath
- **"Size dependent formation of Au-NPs monolayer under high electric field"**, Firdous Ahmad Deader, Yawar Abbas, Moh'd Rezeq
- **"Rapid and Low-cost fabrication of Graphene from Pencil lead"**, Natchanon Jiwawat, Thapan Leukulwatanachai, Kunbhass Subhakornphichan, Siwagorn Limwathanagorn, Sittinadh Wanotayan, Porpin Pungetmongkol

Who will the winners be? Let's discover them at the conference dinner!

NANOXPRESS EVENT

A special session aimed to bolster international research cooperation within the IEEE Nanotechnology Council (IEEE NTC) Global Community through proactive Speed Ideation and team-building initiatives. Collaborating internationally not only boosts research visibility but also enriches perspectives, leading to increased citations. Moreover, research teams can leverage each country's strengths and resources. Successful collaborations offer enhanced professional growth opportunities such as Fulbright scholarships. Interested participants must register.

CONFERENCE DINNER

We are happy to welcome you during the Conference Dinner on Wednesday Evening.

Camino de los Saúcos
Ctra. Piles al Infanzón, n. 3503
33203 Gijón, Asturias

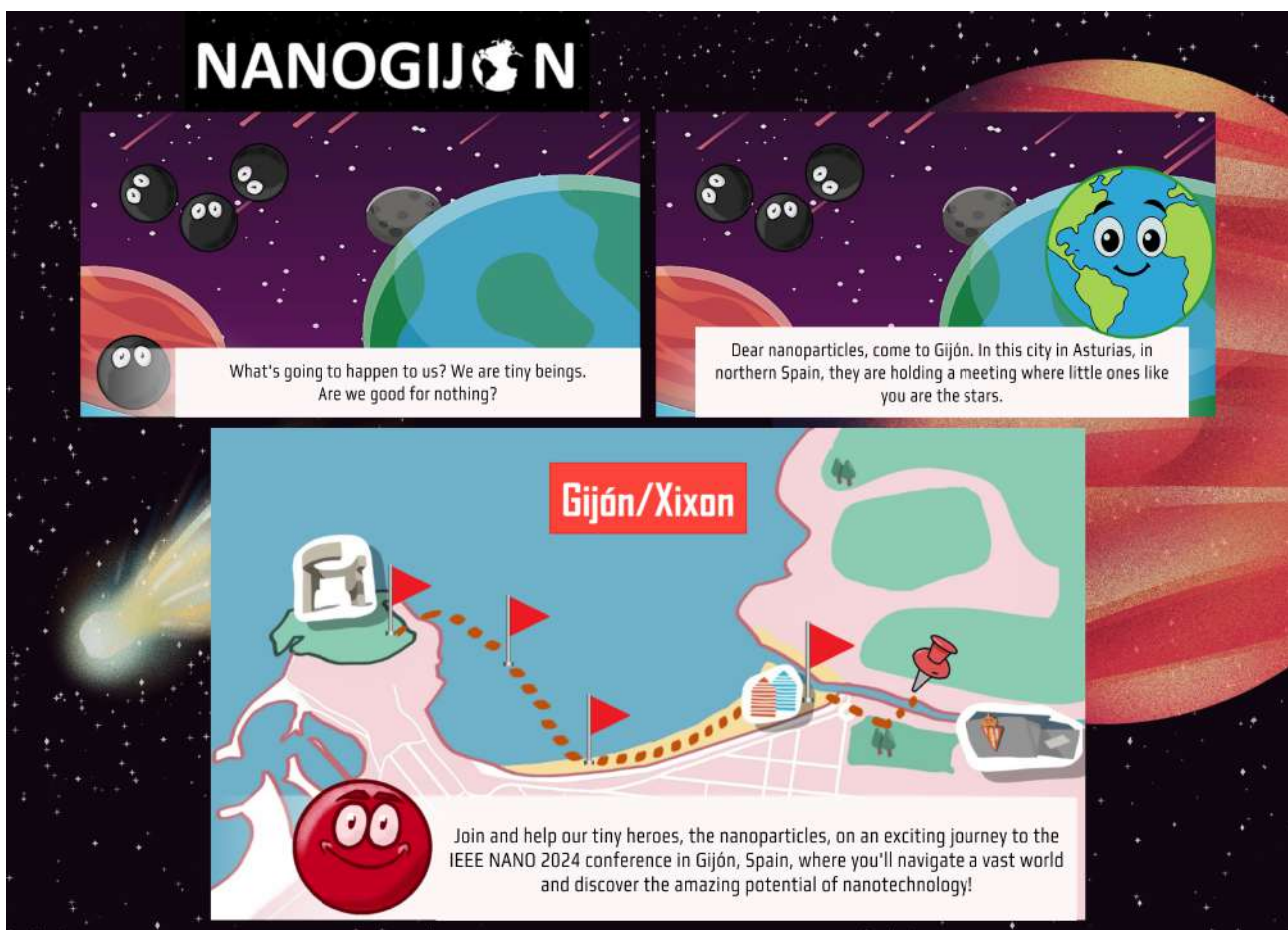
Buses will be made available to transport attendees from the conference center to the restaurant. (They will be waiting in the parking lot of El Molinón football stadium, just in front of the Feria de Muestras.)



NANOEXPLORE GIJÓN: A NANOTECHNOLOGY LEGACY FOR THE CITY

The **NANOExplore Gijón** project seeks to open new opportunities for growth and learning for all children to build a more dignified and just society. This project, developed by a team of volunteers from University of Oviedo and Mar de Niebla Foundation, aims **to show young people that nanoscience and nanotechnology are within everyone's reach, regardless of their background or social context.** The main element of NANOExplora Gijón is a kit containing a variety of small experiments and activities that illustrate the principles and applications of nanoscience and nanotechnology. Inspired by Nanoinventum, developed by Jordi Díaz-Marcos et al. from the University of Barcelona, the IEEE NANO team has expanded the original nano-kit using with magnetic fluids, quantum dots, and an online video game. In its initial phase, NANOExplore Gijón is financially supported by the IEEE NANO 2024 conference, but a crowdfunding campaign will be launched to improve the NANOkit and expand the project's reach through collaboration with other non-profit socio-educational organizations. IEEE NANO 2024 will be a meaningful and memorable conference for the City of Gijón.

Videogame: NANOGijón Join our tiny heroes, the nanoparticles, on an exciting journey to the IEEE NANO 2024 conference in Gijón, Spain. In this adventure, you'll help the nanoparticles navigate through a world that's huge compared to them and discover the amazing things that even the smallest beings can achieve. Get ready for a fun and educational experience where you'll learn about the fascinating world of nanotechnology!



SPONSOR



The IEEE Nanotechnology Council (NTC) is a multidisciplinary group that aims to advance and coordinate work in Nanotechnology throughout the IEEE in scientific, literary, and educational areas. The Council supports nanotechnology's theory, design, development, and scientific, engineering, and industrial applications. There are no membership requirements; participation in this Technical Council is free.

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EXHIBITORS



vsparticle

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IEEE Open Journal of Nanotechnology

OJ-NANO



IEEE

The 17th IEEE International Conference on
Nano/Molecular Medicine and Engineering

IEEE-NANOMED 2024

Dec. 2 to 5, 2024
Honolulu, Hawaii, USA

IEEE-NANOMED is one of the premier annual events organized by the IEEE Nanotechnology Council (NTC), and brings together physicians, scientists, and engineers from all over the world and every sector of academy and industry for the advancement of basic and clinical research in medical and biological sciences through nano/molecular medicine and engineering. Attendees of IEEE-NANOMED can share their latest research in engineering and nano/molecular medicine with other practitioners in their field and related fields, ranging from basic scientific and engineering research to translational and clinical research.

<http://iee-nanomed.org/2024/>



Suggested topics:

- Nano and molecular technologies in medical theranostics
- Nanotechnology in drug delivery
- Biomedical imaging
- Bio/Nano sensing
- Biochips and Bio-MEMS
- Biomechatronics
- Biological interfaces
- Nanobiotechnology
- Translational medicine
- Bioprinting
- Biomicrofluidics

Important Dates:

Two-Page Abstract Deadline:
July 12, 2024

Notification of Acceptance:
September 13, 2024

Full Paper Deadline:
July 12, 2024
(for best paper competition)

October 11, 2024
(for inclusion on IEEE Xplore)

Early Bird Registration:
September 30, 2024

Accepted full papers will be published in the IEEE Xplore database and are EI indexed (<http://ieeexplore.ieee.org>).

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The **IEEE Nanotechnology Council (NTC)** is a multi-disciplinary group supporting the theory, design, and development of nanotechnology and its scientific, engineering, and industrial applications.

The NTC provides you with opportunities to keep technically up to date through our publications and conferences, network with like-minded colleagues, and take advantage of our educational materials.

PUBLICATIONS

The Council sponsors or co-sponsors five publications and eight well-recognized conferences, in addition to the Quarterly Newsletter.

For a full list of NTC's sponsored publications and conferences, please visit the NTC website at ieeenano.org.

IEEE Transactions on Nanotechnology (T-NANO)

IEEE Nanotechnology Magazine (INM)

IEEE Transactions NanoBioscience (T-NB)

IEEE Open Journal on Nanotechnology (OJ-NANO)

IEEE Journal of Photovoltaics (J-PV)

CONFERENCES

- » IEEE International Conference on Nanotechnology (NANO)
- » IEEE Nanotechnology Materials and Devices Conference (NMDC)
- » IEEE International Conference on Nano/Molecular Medicine and Engineering (NANOMED)
- » IEEE International Conference on Nano/Micro Engineered and Molecular Systems (NEMS)
- » International Conference on Manipulation, Manufacturing and Measurement on the Nanoscale (3M-NANO)
- » IEEE International Conference on Nanomaterials: Applications & Properties (NAP)
- » International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS)
- » International Conference on Electron, Ion and Photon Beam Technology and Nanotechnology (EIPBN)

ieeenano.org





Through the Council's sponsored activities, participants have the opportunity to publish and collaborate on research, connect with colleagues, stay current on news and events, develop standards, and participate in educational activities.

The **IEEE Nanotechnology Council** is part of **Division I – Circuits and Devices** and is made up of **22 member societies**:

- » Aerospace & Electronic System Society (AES)
- » Antennas & Propagation Society (AP)
- » Circuits & Systems Society (CAS)
- » Communications Society (COM)
- » Electronics Packaging Society (EPS)
- » Computational Intelligence Society (CI)
[Formerly Neural Networks (NN) Society]
- » Computer Society (C)
- » Dielectrics and Electrical Insulation Society (DEIS)
- » Electron Devices Society (ED)
- » Engineering in Medicine & Biology Society (EMB)
- » Electromagnetic Compatibility Society (EMC)
- » Industrial Electronics Society (IE)
- » Instrumentation & Measurement Society (IM)
- » Photonics Society (PS)
- » Magnetics Society (MAG)
- » Microwave Theory & Techniques Society (MTT)
- » Nuclear and Plasma Sciences Society (NPS)
- » Reliability Society (RL)
- » Solid State Circuits Society (SSC)
- » Robotics & Automation Society (RA)
- » Systems, Man, & Cybernetics Society (SMC)
- » Ultrasonics, Ferroelectrics, & Frequency Control Society (UFFC)

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Visit: ieeenano.org/technical-activities

» **Chapters:** Networking opportunities on the local level through our Chapters, with technical experts around the world where you can participate in local activities.

Visit: ieeenano.org/chapters

SOCIAL MEDIA

For more information about these and other NTC activities, please visit our Facebook page at bit.ly/2lwORez.



IEEE NANO 2025

The 25th IEEE International Conference on Nanotechnology



July 13 - 16, 2025
Washington DC, USA

Announcement and Call for Papers

Since its founding in 2001, **IEEE NANO** has been the flagship conference of the IEEE Nanotechnology Council (NTC). It promotes advanced research in nanoscience and nanotechnology.

The 25th IEEE International Conference on Nanotechnology (**IEEE NANO 2025**) will be held **July 13 - 16 2025**, in **Washington, DC, USA**.

IEEE NANO 2025 invites contributions from both academic and industry-based researchers in the field of nanotechnology. Authors should prepare a full conference paper using the template in the IEEE style and submit it for review by **March 1, 2025**.

Look at our web page to see the latest updates!
<https://2025.ieeenano.org/>

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IEEE NANO

WORKSHOPS DAY

JULY 12, 2024



LABORAL CIUDAD DE LA CULTURA, GIJÓN

This day full of interesting topics will be the golden brooch of a week brimming with cutting-edge nanoscience and nanotechnology discussions. Don't miss out on this opportunity to delve deep into fascinating topics and expand your knowledge!

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The workshops are accessible at no cost prior registration. Please note that registration for the IEEE NANO 2024 conference is mandatory to attend the workshops.

