

General Chair's Message

It is my great pleasure to welcome you at the 2017 IEEE International Workshop on Antenna Technology (iWAT 2017) in Athens, Greece, 1 - 3 March 2017. iWAT is arriving again to Europe after a series of annual international workshops in Singapore (2005), White Plains, USA (2006), Cambridge, UK (2007), Chiba, Japan (2008), Santa Monica, USA (2009), Lisbon, Portugal (2010), Hong Kong, PRC (2011), Tucson, USA (2012), Karlsruhe, Germany (2013), Sydney, Australia (2014), Seoul, Republic of Korea (2015), and Cocoa Beach, Florida, USA (2016).



iWAT 2017 focuses on small antennas and application of antennas in medical technologies. Traditionally, it combines in a single-track format oral presentations being delivered by invited prominent researchers and professors and poster sessions that provide valuable interaction and networking time among the attendees.

This year the Technical Program Chairs have delivered an excellent and exciting conference program. We have received 165 papers with authors from more than 35 Countries and Territories: 54% from Europe, Middle East and Africa, 34% from Asia/Pacific and 12% from North and South America. After a tedious review process, 91 papers have been selected for poster presentation. We have also organized 10 convened oral sessions with 48 presentations that cover a broad range of topics. Finally we are hosting 5 prominent speakers for keynote talks.

The local organizing committee is extremely honoured by the large participation of prominent researchers from all around the world in every aspect of antennas. We are impressed from the high quality of contributions in both oral and technical interactive sessions. We are also pleased to see that a great number of students is participating and contributing to the certain success of this year's meeting.

I hope that iWAT 2017 will be a privileged forum for interacting on the state-of-the-art technologies in antenna design, in investigation and utilization of advanced electromagnetic materials, in the theoretical and practical aspects of small antennas, in the implementation of terahertz frequencies, in the development of efficient and smart arrays.

iWAT 2017 is organized by University of Patras, Greece and supported by IEEE APS, IEEE Greece Section and APS Local Greece Chapter. It is technically supported by IEEE and its proceedings are indexed in IEEE Xplore. I should not omit expressing our gratitude to our gold and silver sponsors and exhibitors that contribute to the realization of iWAT 2017.

I am looking forward to seeing you at iWAT 2017 in Athens and I expect you to benefit from the high quality plenary talks, oral and technical interactive sessions followed by stimulating discussions with colleagues on hot topics in our field.

iWAT2017 General Chair
Prof. Stavros Koulouridis

1-3 March 2017, Athens – Greece

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General Information

Venue

Electra Palace Hotel in Athens, is a five star property, centrally located in the heart of Athens and the old town of Plaka and is within walking distance from Acropolis and the Acropolis museum. Metro station is just 200 meters from the hotel. The Electra Palace is located 35 Km. from the “Eleftherios Venizelos” Athens Intl airport and 10 Km. from Piraeus port.

The hotel has 102 Standard guestrooms, 33 Superior rooms, 9 Junior suites, 10 Suites and 1 Presidential Suite. All the rooms and suites are fully air-conditioned and have wooden floors , sound proof windows, direct dial telephone ,”Wi-Fi” internet connection, colour LCD TV, mini bar, smoke detector, night light, emergency light connected to the power generator, electronic safe box (lap top size), hairdryer, bathrobes, slippers and magnified mirror. PURE Allergy friendly rooms provide an alternative environment free from most allergens and irritants.

The hotel offers an all day dining venue, Motivo Restaurant, with a magnificent view to the garden which is an oasis in the city centre with an extensive and innovative selection of Mediterranean cuisine available daily from 06:45 to 22:30. It also boasts to have a treasure, Electra Roof Garden Restaurant, where the guest will be thrilled by the innovative Greek cuisine, while overlooking the Acropolis and the old Athenian town of Plaka, (daily: 19:00 – 24:00).

Among other the hotel offers a unique relaxation area with an indoor swimming pool and Jacuzzi, a gym, sauna and steam bath and finally the Olive Tree Spa that offer massage and facial treatments by experienced practitioners.

On – site Registration

Registration Desk will be open at the basement area of the Electra Palace Hotel during the conference:

March 1st (Wednesday): 7:30 am – 5:30 pm

March 2nd (Thursday): 8:30 am – 5:30 pm

March 3rd (Friday): 8:30 am – 5:30 pm

Oral presentation

Oral Presentations will take place at the basement level of Electra Palace Hotel, Ballrooms I, II

Poster Presentations

Poster Presentations will be in Mezzanine level of Electra Palace Hotel.

Coffee Breaks, Lunches

Coffee breaks will take place at mezzanine level of Electra Palace Hotel. Lunches will be also provided at mezzanine level in a buffet standing format. They are free for all delegates and the exhibitors/visitors with the specific day pass

Welcome Reception

Welcome Reception will take place in Electra Palace Hotel.

Walking Guided Tour

A one-hour walking guided tour in English from Electra Palace Hotel to Royal Olympic hotel is scheduled, weather permitting. Departure is strictly at 18:50. Please be at hotel lobby at 18:45 at latest

Banquet

The conference banquet will take place on March 2, at gourmet Ioannis Restaurant, the roof top garden of Royal Olympic Hotel. Royal Olympic Hotel is in walking distance from conference venue. More information can be found at the conference website for people that won't follow walking guided tour..

Poster Awards Announcement

Poster awards will be announced during the banquet.

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Program in a glance

Wednesday March 1st, 2017

- 8:40-10:40 W1: **Metasurface and Metamaterial-based Antennas**
10:40-11:10 Coffee Break
11:10-12:50 W2: **Characteristic modes for antenna design and related topics**
12:50-13:50 Lunch
13:50-15:10 W3: **Technical Interactive Session. Student Finalists**
15:10-15:50 Plenary: **Challenges for Characteristic Modes in Antenna Design**
by J. T. Bernhard
15:50-16:20 Coffee Break
16:20-17:40 W4: **Wireless Power Charging and Energy Harvesting with Biomedical Emphasis**
17:40-19:00 W5: **Implanted, Encapsulated and Wearable Antennas**
19:00-21:00 Welcome Reception

Thursday, March 2

- 9:00-10:40 T1: **Advanced Antenna Arrays**
10:40-11:10 Coffee Break
11:10-12:50 T2: **Millimeter-wave/THz/Nano Antennas**
12:50-13:50 Lunch
13:50-15:10 T3: **Technical Interactive Session**
15:10-15:50 Plenary: **New antenna designs for Ka-band and higher frequencies using 3D-printing technologies** by J. R. Mosig
15:50-16:30 Plenary: **The Balance Between Computation and Intuition in Antenna Design** by N. K. Uzunoglu
16:30-17:00 Coffee Break
17:00-18:40 T4: **Antennas in Medical Diagnosis and Therapeutics**
20:00-23:59 Banquet

Friday, March 3

- 9:00-10:40 F1: **Small Antennas for Portable Devices (Handsets, RFID, Laptops, wearables)**
10:40-11:10 Coffee Break
11:10-12:50 F2: **Multibeam, MIMO and Beamforming Arrays**
12:50-13:50 Lunch
13:50-15:10 F3: **Technical Interactive Session**
15:10-15:50 Plenary: **The Orthogonal Methods for Antenna Arrays Beamforming** by J. N. Sahalos)

- 15:50-16:30 Plenary: **EM Band-Gap High Impedance Surfaces for Conformal Low-Profile Antennas and RCS Reduction** by C. A. Balanis
- 16:30-17:00 Coffee Break
- 17:00-18:40 F4: **Conformal, On-Chip and In-Package Antenna Systems**

TECHNICAL PROGRAM

08:30 Welcome

Wednesday, March 1, 08:40 - 10:40

W1: Metasurface and Metamaterial-based Antennas

Chairs: George V. Eleftheriades (University of Toronto, Canada), Hisamatsu Nakano (Hosei University, Japan)

08:40 Planar Bent-Cross-Shaped Metaline Antenna for Circularly Polarized Reconfigurable Radiation

Hisamatsu Nakano, Tomohiro Yoshida, Yuhei Kameta and Junji Yamauchi (Hosei University, Japan)

09:00 Metasurfaces for Perfect Control of Reflection

Ana Diaz-Rubio, Viktor Asadchy, Amr Elsakka and Sergei Tretyakov (Aalto University, Finland)

09:20 Meta-Atom Materials for RF Microwave Surfaces Using FDM Additive Manufacturing

J (Yiannis) Vardaxoglou (Loughborough University, United Kingdom)

09:40 Shielded Perfect Reflectors Based on Omega-Bianisotropic Metasurfaces

Ariel Epstein (Technion - Israel Institute of Technology, Israel); George V. Eleftheriades (University of Toronto, Canada)

10:00 Non-Reciprocal Wave Manipulation with Non-Linear Metasurfaces

Dimitrios Sounas and Andrea Alù (The University of Texas at Austin, USA)

10:20 Low-Profile Broadband Mushroom and Metasurface Antennas

Zhi Ning Chen; Wei Liu (National University of Singapore, Singapore); Xianming Qing (Institute for Infocomm Research, Singapore)

10:40 Coffee Break

Wednesday, March 1, 11:10 - 12:50

W2: Characteristic modes for antenna design and related topics

Chairs: Nader Behdad (University of Wisconsin-Madison, USA), Raj Mittra (Penn State University, USA)

11:10 Design of a Vehicle-Mounted, Bandwidth-Enhanced, Electrically Small VHF Antenna Using a Characteristic-Mode-Based Approach

Ting-Yen Shih and Nader Behdad (University of Wisconsin-Madison, USA)

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11:30 Eigen-analysis of Composite Radiating Structures with Emphasis on Characteristic Modes: a Review

George Kyriacou (Democritus University of Thrace, Greece); Constantinos Zekios (UMASS, USA); Panagiotis Theofanopoulos (Arizona State University & Arizona State University, USA); Ronis T. Maximidis (Eindhoven University of Technology, The Netherlands); Thanasis Papaioannou, Petros Allilomes and Christos S Lavranos (Democritus University of Thrace, Greece); Theodoros Kaifas (Aristotle University of Thessaloniki, Greece)

11:50 Characteristic Modes Analysis for Pattern Shaping of Handheld Platforms

Francesco Alessio Dicandia and Simone Genovesi (University of Pisa, Italy); Agostino Monorchio (University of Pisa & CNIT, Italy)

12:10 A Critical Look at the Characteristic Mode Analysis for the Design and Pattern Synthesis of Antennas Mounted on Complex Platforms

Raj Mittra (Penn State University, USA)

12:30 Discussion

12:50 Lunch

Wednesday, March 1, 13:50 - 15:10

W3: Technical Interactive Session

Chairs: Dimitra I Kaklamani (National Technical University of Athens, Greece), George Kyriacou (Democritus University of Thrace, Greece)

W3-SC: Student Finalists

W3-SC.1 A Performance Comparison of Compressed Sensing Algorithms for Scatterer Detection

Daisuke Abe, Yasutaka Ogawa, Toshihiko Nishimura and Takeo Ohgane (Hokkaido University, Japan)

W3-SC.2 Antenna Gain Evaluation Based on Weighting Near-Field Measurements

Liliana Anchinid (Constanta Maritime University & University Politehnica of Bucharest, Romania); Razvan D. Tamas, Adrian Androne and George Caruntu (Constanta Maritime University, Romania)

W3-SC.3 Pattern Reconfigurable Antenna with Four Directions Hidden in the Vehicle Roof

Gerald Artner (Vienna University of Technology, Austria); Jerzy Kowalewski (Karlsruhe Institute of Technology, Germany); Christoph F

Mecklenbräuker (Vienna University of Technology, Austria); Thomas Zwick (Karlsruhe Institute of Technology (KIT), Germany)

W3-SC.4 Septum-less, Hexagonal Waveguide Based Circularly Polarized Horn Antenna for Mm-Wave and Terahertz Band

Shubhendu Bhardwaj and John L. Volakis (Ohio State University, USA)

W3-SC.5 On the Performance Evaluation of Two Novel Fractional Frequency Reuse Approaches for OFDMA Multi-User Multi-Cellular Networks

Maria Seimeni, Georgios Tsivgoulis, Panagiotis Gkonis, Dimitra I Kaklamani and Iakovos S. Venieris (National Technical University of Athens, Greece); Christos Papavassiliou (Imperial College London, United Kingdom)

W3-SC.6 Highly Radiative Symmetric Plasmonic Leaky Wave Antenna

Amin Kianinejad (National University of Singapore & Institute for Infocomm Research, ASTAR, Singapore); Zhi Ning Chen and Cheng-Wei Qiu (National University of Singapore, Singapore)

W3-SC.7 A Trident like Antenna with Reconfigurable Patterns for Automotive Applications

Jerzy Kowalewski, Sebastian Peukert, Tobias Mahler, Jonathan Mayer, Thomas Zwick (Karlsruhe Institute of Technology (KIT), Germany)

W3-SC.8 Channel Capacity and Beamforming Issues in MIMO Channels Subject to Tolerances

Tobias Mahler, Daniel Müller, Jörg Eisenbeis, Christian von Vangerow, Sören Marahrens and Thomas Zwick (Karlsruhe Institute of Technology (KIT), Germany)

W3-SC.9 Low-Profile Aperture-Shared X/Ka-band Dual-Polarized Antenna for DBF-SAR Applications

Chunxu Mao and Steven Gao (University of Kent, United Kingdom); Tobias Rommel (German Aerospace Centre (DLR), Germany)

W3-SC.10 Ultra-Wideband Array in PCB for Millimeter-Wave 5G and ISM

Markus Novak (The Ohio State University, USA); Felix Miranda (NASA John H. Glenn Research Center, USA); John L. Volakis (Ohio State University, USA)

W3-SC.11 Towards 600 MHz LTE Smartphones via Tunable Magnetodielectric Printed Inverted-F Antennas

Dimitrios K. Rongas (National Technical University of Athens, Greece); Constantine G. Kakoyiannis (IMST GmbH, Germany); George Fikioris (National Technical University of Athens, Greece)

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W3-SC.12 Understandings of Maximum Spatially-Averaged Power Density in 5G RF EMF Exposure Study

Bo Xu (KTH Royal Institute of Technology, Sweden & Zhejiang University, P.R. China); Kun Zhao (KTH Royal Institute of Technology & Sony Mobile Communication AB, Sweden); Sailing He (Royal Institute of Technology, Sweden); Zhinong Ying (SONY Mobile Communications AB, Sweden)

W3-SC.13 Wideband Circularly Polarized Wide-Beamwidth Antenna Using S-Shaped Dipole

Steven Gao, Long Zhang, Qi Luo and Wenting Li (University of Kent, United Kingdom)

W3-I: Antennas for Medical Applications, Wearable's - Body Area, RFID, Near Field, Power Transfer, Metamaterials

W3-I.1. Metasurface-Based Circularly Polarized Patch Array Antenna Using Sequential Phase Feed

Son Xuat Ta and Ikmo Park (Ajou University, Korea)

W3-I.2. Modal-Expansion Analysis of Monopole Antennas Coated by a Finite-height Tensor Impedance Surface

Zhihao Jiang and Wei Hong (Southeast University, P.R. China)

W3-I.3. Cost- And Time-effective Sewing Patterns for Embroidered Passive UHF RFID Tags

Nicolas Brechet and Galatée Ginestet (University of Montpellier, France); Jeremie Torres (Montpellier University, France); Elham Moradi, Leena Ukkonen, Toni Björninen and Johanna Virkki (Tampere University of Technology, Finland)

W3-I.4. Anisotropic Metamaterial Based Decoupling Strategy for MIMO Antenna in Mobile Handsets

Su Xu, Ming Zhang, Xueliang Shi, Daqing Liu, Huailin Wen and Jun Wang (Huawei Technologies Co. Ltd, P.R. China)

W3-I.5. Cell Apoptosis Measurement with THz Biosensor

Biaobing Jin (Nanjing University, P.R. China); Caihong Zhang (Nanjing University & Research Institute of Superconductor Electronics, P.R. China); Liang Ding and Yayi Hou (Division of Immunology, School of Medicine Nanjing University, P.R. China)

W3-II: Antenna Arrays, Beam-forming, MIMO, Signal processing in Antennas, Compressed sensing

W3-II.1 Effect of LVDS Link Speed and Pattern Length on Spectrum Measurements of a Spacewire Harness

Anargyros T. Baklezos (National Technical University of Athens, Greece); Christos D. Nikolopoulos (National Technical University of Athens & School of Electrical and Computer Engineering, Greece); Christos Capsalis (National Technical University of Athens, Greece); Stylianos Tsatalas (EMTech – Excel Micro Technologies, Greece)

W3-II.1 A Planar Wideband Quasi-Yagi Antenna with High Gain and FTBR
Mina Wahib (Royal Military College of Canada, Canada); Al P. Freundorfer (Queen's University, Canada); Yahia Antar (Royal Military College of Canada, Canada)

W3-II.2 Cooperative Diversity Performance of Hybrid Satellite and Terrestrial Millimeter Wave Backhaul 5G Networks
Charilaos Kourogiorgas, Apostolos Z. Papafragkakis, Athanasios D. Panagopoulos and Vasileios Sakarellos (National Technical University of Athens, Greece)

W3-II.3 Numerical Analysis of a Grid Array Antenna Printed on a Dielectric Substrate Fed by a Coaxial Line
Toru Kawano (National Defense Academy, Japan); Hisamatsu Nakano (Hosei University, Japan)

W3-II.4 Impulse Radio Ultra Wideband for Broadband Indoor Machine-to-Machine Communication Networks: System Performance Evaluation
Apostolos Z. Papafragkakis and Athanasios D. Panagopoulos (National Technical University of Athens, Greece)

W3-III: Antenna Techniques, Broadband, Miniaturized & Small Antennas

W3-III.1 A Method for Determination of Equivalent Dielectric Constant of Planar Transmission Lines on Anisotropic Substrates with Dielectric Overlay
Plamen I. Dankov (Sofia University "St. Kliment Ohridski" & SU, Bulgaria)

W3-III.2 On the Capacity of Wheeler Cap Measurements for Detecting Very Low Antenna Efficiency Levels
Constantine G. Kakoyiannis (IMST GmbH, Germany)

W3-III.3 Low Profile Dipole Antenna over Compact AMC Surface
Nebil Kristou (CEA-LETI); Jean-François Pintos (CEA-LETI, France); Kourosh Mahdjoubi (University of Rennes 1, France)

W3-III.4 Design and Characterization of a Compact Artificial Magnetic Conductor in the UHF Band
Nebil Kristou (CEA-LETI); Jean-François Pintos (CEA-LETI, France); Serge Bories (CEA, France); Kourosh Mahdjoubi (University of Rennes 1, France)

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W3-III.5 Military Field Deployable Antenna Using Origami

Syed Imran Shah and Sungjoon Lim (Chung-Ang University, Korea); Manos M. Tentzeris (Georgia Institute of Technology, USA)

Wednesday, March 1, 15:10 - 15:50, Plenary

Chair: Raj Mittra (Penn State University, USA)

15:10 Challenges for Characteristic Modes in Antenna Design

Jennifer T. Bernhard (University of Illinois, USA)

15:50 ***Coffee Break***

Wednesday, March 1, 16:30 - 17:40

W4: Wireless Power Charging and Energy Harvesting with Biomedical Emphasis

Chairs: Toni Björninen (Tampere University of Technology, Finland), Stavros Koulouridis (University of Patras, Greece)

16:20 Wirelessly Powered Implantable System for Wireless Long-Term Monitoring of Intracranial Pressure

Muhammad Waqas Ahmad Khan, Lauri Tapio Sydänheimo, Toni Björninen and Leena Ukkonen (Tampere University of Technology, Finland)

16:40 Electromagnetic Wave Manipulation and Energy Harvesting Through Metasurfaces

Yijun Feng, Ke Chen, Bo Zhu, Junming Zhao and Tian Jiang (Nanjing University, P.R. China)

17:00 Broadband Meta-Surface with Polarization-Insensitive and Wide-Angle for Electromagnetic Energy Harvesting

Huiteng Zhong and Xuexia Yang (Shanghai University, P.R. China)

17:20 Cellular Wireless Energy Harvesting for Powering Wearable Sensors

Ray Chen, Ben Milligan and Tony Qu (University of Waterloo, Canada); George Shaker (University of Waterloo & Spark Tech Labs, Canada); Safieddin Safavi-Naeini (University of Waterloo, Canada)

Wednesday, March 1, 17:40 - 19:00

W5: Implanted, Encapsulated and Wearable Antennas

Chairs: William G. Scanlon (Queen's University Belfast, United Kingdom), John L. Volakis (Ohio State University, USA)

17:40 Inductive and Radiating Energy Harvesting for an Implanted Biotelemetry Antenna

Quang-Trung Luu (UMR 8507 CNRS, CentraleSupélec, UPMC, Université Paris-Sud, France); Stavros Koulouridis (University of Patras, Greece);

Antoine M Diet (Paris Saclay - Université Paris Sud (GeePs UMR 8507 - IUT de Cachan), France); Yann Le Bihan (GEEPS, France); Lionel Pichon (CentraleSupélec - CNRS - Université Paris Sud & GeePs Laboratory, France)

18:00 **Antenna Considerations for Emerging Implanted Biosensor and Intra-Body Network Applications**

William G. Scanlon (Queen's University Belfast, United Kingdom); Gareth Conway (Queen's University of Belfast & ECIT, United Kingdom)

18:20 **Wearable Antenna with Tripolarization Capability**

Guy A. E. Vandenbosch (Katholieke Universiteit Leuven, Belgium); Sen Yan (KU Leuven, Belgium)

18:40 **Design of Wearable and Implantable Antennas**

Anja K. Skrivervik (EPFL, Switzerland)

19:00 **Welcome Reception**

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Thursday, March 2, 09:00 - 10:40

T1: Advanced Antenna Arrays

Chairs: Qing-Xin Chu (South China University of Technology, P.R. China), Quan Xue (City University of Hong Kong, Hong Kong)

09:00 **Planar Aperture Antennas for Millimeter Wave Applications**

Quan Xue (City University of Hong Kong, Hong Kong)

09:20 **A Wideband Stacked Patch Antenna for Reconfigurable Polarization Applications**

Zhang-Cheng Hao (SEU, P.R. China); Jun Hu and Wei Hong (Southeast University, P.R. China)

09:40 **A Wideband Horizontally Polarized Omnidirectional Antenna Using Tightly Coupled Array Mechanism**

Ying Liu, Liu Hu and Shuxi Gong (Xidian University, P.R. China)

10:00 **Multi-Array Multi-Band Base-Station Antennas**

Qing-Xin Chu, Dong-Ze Zheng and Rui Wu (South China University of Technology, P.R. China)

10:20 **Ultra-Wideband Dual-Linear Polarized Phased Array with 60° Scanning for Simultaneous Transmit and Receive Systems**

Jingni Zhong (Ohio State University & ElectroScience Laboratory, USA); Elias A. Alwan (The Ohio State University & The Electroscience Lab, USA); John L. Volakis (Ohio State University, USA)

10:40 **Coffee Break**

Thursday, March 2, 11:10 - 12:50

T2: Millimeter-wave/THz/Nano Antennas

Chairs: Alexandros Feresidis (University of Birmingham, United Kingdom), Kubilay Sertel (The Ohio State University, USA)

11:10 **Lens-Integrated Differential-Mode Butterfly Antenna for mmW/THz Applications**

Cosan Caglayan and Kubilay Sertel (The Ohio State University, USA)

11:30 **Graphene Based Antennas; are They Useful in Millimeter-Wave and THz Applications?**

Antti V. Räsänen (Aalto University, Finland)

11:50 **Additive Manufactured Millimeter Wave Luneburg Lens Antenna for Automotive Radar Application**

Min Liang, Siyang Cao and Hao Xin (University of Arizona, USA)

- 12:10 **Millimeter-wave and Low-THz Antennas Based on Periodic Surfaces**
Alexandros Feresidis, Despoina Kampouridou and Konstantinos Konstantinidis (University of Birmingham, United Kingdom)
- 12:30 **High-Power Terahertz Emitter Arrays**
Alejandro Rivera-Lavado, Kerlos Atia-Abdalmalak and Gabriel Santamaria-Botello (Universidad Carlos III de Madrid, Spain); David González-Ovejero (Centre National de la Recherche Scientifique - CNRS, France); Guillermo Carpintero (Universidad Carlos III de Madrid, Spain); Ivan Camara-Mayorga (Max Planck Institute fur Radioastronomy, Germany); Luis-Enrique Garcia-Muñoz (University Carlos III of Madrid, Spain); Daniel Segovia-Vargas (Universidad Carlos III de Madrid, Spain)

12:50 **Lunch**

Thursday, March 2, 13:50 - 15:10

T3: Technical Interactive Session

Chairs: Dimitra I Kaklamani (National Technical University of Athens, Greece), George Kyriacou (Democritus University of Thrace, Greece)

T3-I. Antennas for Medical Applications, Wearable's - Body Area, RFID, Near Field, Power Transfer, Metamaterials

- T3-I.1 **Ultra-Fast Reconfigurable Antennas with Phase Change Materials**
Dimitris Anagnostou (Heriot-Watt University (UK), United Kingdom); David Torres (Michigan State University, USA); George Goussetis (Heriot-Watt University, United Kingdom); Nelson Sepulveda (Michigan State University, USA)
- T3-I.2 **Theoretical Limitations on Shielding and Reflective Properties of Microwave Metamaterial Absorbers**
Aleksy Solovey (L-3 ESSCO, USA)
- T3-I.3 **The Numerical Evaluations on SAR Around an Implanted Cardiac Pacemaker by a Mobile Phone of Multiple Operating Frequencies**
Kazuyuki Saito and Ryota Akiyama (Chiba University, Japan); Tomoaki Nagaoka and Soichi Watanabe (National Institute of Information and Communications Technology, Japan)
- T3-I.4 **In-Body and On-Body Wave Propagation: Modeling and Measurements**
Pavel A. Turalchuk and Irina Munina (St. Petesburg Electrotechnical University LETI, Russia); Vladimir Pleskachev (St. Petersburg Electrotechnical University & Simicon Ltd., Russia); Vitaliy Kirillov and

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Orest Vendik (St. Petersburg Electrotechnical University, Russia); Irina Vendik (St. Petersburg electrotechnical university, Russia)

T3-I.5 Robust Low-Profile Electromagnetic Band-Gap-Based on Textile Wearable Antennas for Medical Application

Adel Ashyap and Zuhairiah Zainal Abidin (Universiti Tun Hussein Onn Malaysia, Malaysia); Samsul Haimi Dahlan (Universiti Tun Hussien Onn Malaysia, Malaysia); Huda A. Majid (Universiti Tun Hussein Onn Malaysia, Malaysia); Raed A Abd-Alhameed (University of Bradford, United Kingdom)

T3-I.6 Arbitrary Field Intensity Shaping via Multi-Target Optimal Constrained Power Focusing

Gennaro G. Bellizzi (Mediterranea University of Reggio Calabria & IREA - National Research Council, Italy); Lorenzo Crocco (CNR - National Research Council of Italy, Italy); Domenica A. M. Iero (Università Mediterranea di Reggio Calabria, Italy); Tommaso Isernia (University of Reggio Calabria, Italy)

T3-I.7 Sub-GHz Inductive Power Transmission from Helical Coils for Implanted Medical Devices

Antoine M Diet (Paris Saclay - Université Paris Sud (GeePs UMR 8507 - IUT de Cachan), France); Stavros Koulouridis (University of Patras, Greece); Yann Le Bihan (GEEPS, France); Quang-Trung Luu (UMR 8507 CNRS, CentraleSupélec, UPMC, Université Paris-Sud, France); Olivier Meyer (Group of Electrical Engineering - Paris / CentraleSupélec, France); Lionel Pichon (CentraleSupélec - CNRS - Université Paris Sud & GeePs Laboratory, France); Marc Biancheri-Astier (Paris Saclay - Université Paris Sud (GeePs UMR 8507 - IUT de Cachan), France)

T3-II: Antenna Arrays, Beam-forming, MIMO, Signal processing in Antennas, Compressed sensing

T3-II.1 Impact of Antenna Pattern Modeling Errors on RSSI-based DOA Estimation

Martin Wohler (Fraunhofer IIS, Germany); Markus Hartmann (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany); Thorsten Nowak (Friedrich-Alexander-Universität Erlangen-Nürnberg); Albert Heuberger (Fraunhofer IIS, Germany)

T3-II.2 Application of Opposition-Based Learning Concepts for Arbitrary Patch Antenna Design for Wireless Communications

Sotirios Goudos (Aristotle University of Thessaloniki, Greece); Katherine Siakavara (Aristotle University, Greece); Christos Kalialakis (Centre Tecnologic de Telecomunicacions de Catalunya & EETT, Spain)

T3-II.3 A MIMO Antenna Array with Shaped Beam in Waveguide Technology for WiFi Base Stations

Christos Oikonomopoulos-Zachos (IMST GmbH, Germany); Edlira Stavrou (IMST, Germany); Rens Baggen and Oliver Litschke (IMST GmbH, Germany)

T3-II.4 Aerosol Jet Printed 24 GHz End-Fire Quasi-Yagi-Uda Antenna on a 3-D Printed Cavity Substrate

Yuxiao He, Chris Oakley, Prem Chahal, John Albrecht and John Papapolymerou (Michigan State University, USA)

T3-II.5 A Fully Planar Antenna for Millimeter-Wave and 5G Communications Based on a New CSRR-enhanced Substrate-Integrated Waveguide

Maria - Thaleia Passia, Michalis Nitas and Traianos Yioultsis (Aristotle University of Thessaloniki, Greece)

T3-II.6 Reducing Transmission Complexity in MIMO-WCDMA Networks Employing Principal Component Analysis

Panagiotis Gkonis, Andrew Kapsalis, Dimitra I Kaklamani and Iakovos S. Venieris (National Technical University of Athens, Greece); Constantinos Zekios (UMASS, USA); Michael Chryssomallis and George Kyriacou (Democritus University of Thrace, Greece)

T3-II.7 Magneto-dielectric Substrate Influence on the Efficiency of a Reconfigurable Patch Antenna

Evmorfili Andreou (NCSR Demokritos & National Technical University of Athens, Greece); Theodore Zervos (NCSR "Demokritos", Institute of Informatics & Telecommunications, Greece); Eirini Varouti (NCSR Demokritos, Institute for Advanced Materials, Greece); Michael Pissas (Institute of Nanoscience and Nanotechnology, NCSR Demokritos, Greece); Christos Christides (University of Patras, Greece); Antonis A Alexandridis (NCSR Demokritos, Greece); George Fikioris (National Technical University of Athens, Greece)

T3-II.8 60-GHz Air-Cavity-Fed Slot Antenna Array Using Modified Silicon Micromachining Process

Yue Li, Le Chang, Zhijun Zhang and Zheng-He Feng (Tsinghua University, P.R. China)

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T3-III: Antenna Techniques, Broadband, Miniaturized & Small Antennas

T3-III.1 Modified Elliptical Antipodal Vivaldi Antenna with Elliptical Tapered Slot Edge and Circular Loads

Shereen AbdelBaky (German University in Cairo, Egypt); Hany F Hammad (German University Cairo, Egypt)

T3-III.2 Indirect Impedance Measurement of a Small Dipole Antenna over a Ground Plane

Yutong Yang (Advanced Energy Industries, Inc., USA); Do-Hoon Kwon (University of Massachusetts Amherst, USA)

T3-III.3 A Combined Electric/Magnetic Field Surface Volume Integral Equation Approach for the Fast Characterization of Microstrip/Substrate Integrated Waveguide Structures

Thomas Vaupel (Fraunhofer FHR, Germany)

T3-III.4 Bandwidth Enhancement of a Supershape Patch Antenna Using Multiple Feeding Technique

Anastasios G. Koutinos, Georgios Ioannopoulos and Michael Chryssomallis (Democritus University of Thrace, Greece); Diego Caratelli (The Antenna Company, The Netherlands); George Kyriacou (Democritus University of Thrace, Greece)

T3-III.5 Temporal Width of Propagated Electromagnetic Pulses in Causal, Dispersive and Absorptive, Dielectrics

Constantinos Balictsis (Hellenic Telecommunications and Post Commission - EETT, Greece)

T3-III.6 Break the Electron Speed Limit to Generate Cherenkov Radiation on a Chip

Long Xiao and Hui Tan (China Ship Development and Design Center, P.R. China); Li Tao (Fudan University, Shanghai, P.R. China); Chun Wang (China Ship Development and Design Center, P.R. China)

T3-III.7 Clever Dumb Antenna: Passive Multi-beam Antenna for Broadband Wireless Communication

John Howard and Chuck Fung (Electromagnetic Technologies Industries Inc (ETI), USA)

T3-III.8 Horizontally Polarized Omni-directional Antenna Using Orthogonal Polarization Conversion FSS

Toshikazu Hori, Ryuji Kuse, Shiro Handa and Mitoshi Fujimoto (University of Fukui, Japan)

T3-III.9 A Novel Multiple-Stub Ultra-Wide Band Antenna

Yanni Cui (Yunnan University, P.R. China); Qiong Zhou (Yunnan University, P.R. China); John Xiupu Zhang (Concordia University, Canada); Dongya Shen and Yanghao Zhou (Yunnan University, P.R. China)

T3-III.10 Towards a Methodology for Conformable Antenna Design

Mohamed El Badawe and Omar M Ramahi (University of Waterloo, Canada)

T3-III.11 A Novel Method for Identifying Complex Zeros by Searching the Laplace-Plane for Local Minima

Nuzhat Yamin, Venkatesh Avula and Ata Zadehgo (University of Idaho, USA)

T3-III.12 A Printed Monopole ESPAR Antenna for Truck-to-Truck Communications

Leonidas Marantis (University of Piraeus, Greece); Anastasios Paraskevopoulos (Loughborough University, United Kingdom & University of Piraeus, Greece); Dimitrios K. Rongas (National Technical University of Athens, Greece); Athanasios G. Kanatas (University of Piraeus, Greece); Christos Oikonomopoulos-Zachos (IMST GmbH, Germany); Sebastian Voell (MAN Truck & Bus AG, Germany)

Thursday, March 2, 15:10 - 16:30, Plenary

Chairs: Constantine G. Kakoyiannis (IMST GmbH, Germany), Marco A. Antoniadis (University of Cyprus, Cyprus)

15:10 New antenna designs for Ka-band and higher frequencies using 3D-printing technologies

J. R. Mosig (École Polytechnique Fédérale de Lausanne, Switzerland)

15:50 The Balance Between Computation and Intuition in Antenna Design

N. K. Uzunoglu (National Technical University of Athens, Greece)

16:30 Coffee Break

Thursday, March 2, 17:00 - 18:40

T4: Antennas in Medical Diagnosis and Therapeutics

Chairs: Lorenzo Crocco (CNR - National Research Council of Italy, Italy), Kazuyuki Saito (Chiba University, Japan)

17:00 Application of Microwave Energy to Therapeutic Devices

Kazuyuki Saito, Naoyuki Ogasawara and Koichi Ito (Chiba University, Japan)

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17:20 **Short Interfacial Antennas for Medial Microwave Imaging**

Jürgen Sachs (Ilmenau University of Technology, Germany); Marko Helbig and Sebastian Ley (Technische Universität Ilmenau, Germany); Peter Rauschenbach (Technische Universität Ilmenau); Martin Kmec and Kai Schilling (Ilmsens GmbH)

17:40 **Updating the Microwave Engineer's Toolbox to Design Phased Arrays for Medical Applications**

Lorenzo Crocco (CNR - National Research Council of Italy, Italy); Ovidio Mario Bucci (University of Naples, Italy)

18:00 **Numerical Estimation of Electromagnetic Coupling Between Metallic Plates Implanted in Human Head and External RF Fields**

Takashi Hikage (Hokkaido University, Japan); Tomoaki Nagaoka and Soichi Watanabe (National Institute of Information and Communications Technology, Japan)

18:20 **Bandwidth and Directivity Enhancement of Metamaterial-Loaded Loop Antennas for Microwave Imaging Applications**

Marco A. Antoniadis (University of Cyprus, Cyprus); Sasan Ahdi Rezaeieh and Amin Abbosh (The University of Queensland, Australia)

20:00 **Banquet**

Friday, March 3, 09:00 - 10:40

F1: Small Antennas for Portable Devices (Handsets, RFID, Laptops, wearables)

Chairs: Hiroyuki Arai (Yokohama National University, Japan), Zhi Ning Chen (National University of Singapore, Singapore)

09:00 Switched Beam Antenna Attachment of Mobile Satellite Communication for Handset Terminal

Hiroyuki Arai (Yokohama National University, Japan)

09:20 An AMC Inspired Small Antenna MACKEY and Its Wideband/Multiband Design

Shigeru Makino (Kanazawa Institute of Technology, Japan)

09:40 Broadband Planar Sleeve Dipole Antenna

Takatsugu Fukushima, Naobumi Michishita and Hisashi Morishita (National Defense Academy, Japan); Naoya Fujimoto (Hitachi Kokusai Electric Inc., Japan)

10:00 Analysis of Electromagnetic Energy Absorption in the Human Body for Mobile Terminals

Hanyang Wang (Huawei Technologies, United Kingdom)

10:20 A Novel Low-Profile Circularly Polarized UHF Crossed Dipole Antenna

Han Zhou (Shanghai Jiao Tong University, P.R. China); Junping Geng (Shanghai Jiaotong University, P.R. China); Ronghong Jin (Shanghai Jiao Tong University, P.R. China); Xianling Liang and Weiren Zhu (Shanghai Jiaotong University, P.R. China); Liang Liu (Shanghai Jiao Tong University, P.R. China)

10:40 Coffee Break

Friday, March 3, 11:10 - 12:50

F2: Multibeam, MIMO and Beamforming Arrays

Chairs: Tzyh-Ghuang Ma (National Taiwan University of Science and Technology, Taiwan), Tobias Mahler (Karlsruhe Institute of Technology (KIT), Germany)

11:10 Simulations and Measurements of 15 and 28 GHz Indoor Channels with Different Array Configurations

Qingbi Liao (LTH Faculty of Engineering, Lund University, Sweden); Zhinong Ying (SONY Mobile Communications AB, Sweden); Carl Gustafson (Lund University, Sweden)

11:30 New Approaches for Realizing Beam-Switching/Scanning Antenna Arrays

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Tzyh-Ghuang Ma, Huy-Nam Chu and Jhen-Jia Liao (National Taiwan University of Science and Technology, Taiwan)

11:50 **From Heuristic to Deterministic Antenna Design: Exploring Virtual and Real World Testdrives for Mobile Antenna Requirements**

Tobias Mahler (Karlsruhe Institute of Technology (KIT), Germany); Jerzy Kowalewski, Benjamin Nuss and Jonathan Mayer (Karlsruhe Institute of Technology, Germany); Thomas Zwick (Karlsruhe Institute of Technology (KIT), Germany)

12:10 **Smart Antennas for Satellite Communications on the Move**

Steven Gao and Qi Luo (University of Kent, United Kingdom)

12:30 **Two-Dimensional Beam Scanning Antenna Array with 90-Degree SIW Twist**

Yu Jian Cheng and Zhi Jie Xuan (UESTC, P.R. China)

12:50 **Lunch**

Friday, March 3, 13:50 - 15:10

F3: Technical Interactive Session

Chairs: Dimitra I Kaklamani (National Technical University of Athens, Greece), George Kyriacou (Democritus University of Thrace, Greece)

F3-I: Antennas for Medical Applications, Wearable's - Body Area, RFID, Near Field, Power Transfer, Metamaterials

F3-I.1 Bi-functional Metasurface Controlling Electromagnetic Wave Scattering of Differently Polarized Wave

Li Cui, Ke Chen and Yijun Feng (Nanjing University, P.R. China)

F3-I.2 Arbitrary Length Zero-Phase Substrate Integrated Coaxial Lines Using NRI-TL Metamaterials

Abdul Quddious (SEECs, National Uni. of Science & Technology, Pakistan); Symeon Nikolaou (Frederick Research Center, Cyprus); Marco A. Antoniades (University of Cyprus, Cyprus)

F3-I.3 A Wearable Antenna Design Using a High Impedance Surface for All-Metal Smartwatch Applications

Dingliang Wen (Queen Mary University of London, United Kingdom); Yang Hao (Queen Mary University, United Kingdom); Hanyang Wang (Huawei Technologies, United Kingdom); Hai Zhou (Huawei Technology (UK), United Kingdom)

F3-I.4 Phased Array Design for near Field Focused Hyperthermia Based on Reciprocity Theorem

Eleni Lekka, Konstantinos Paschaloudis and George Kyriacou (Democritus University of Thrace, Greece)

F3-I.5 Design of 2.45 GHz ESA Metaresonator

Yee Loon Sum and Boon Hee Soong (Nanyang Technological University, Singapore)

F3-I.6 Effect of Tissue Boundaries on the Intra-Body Communication Channel at 2.38 GHz

Yomna El-Saboni (Queen's University, United Kingdom); Gareth Conway (Queen's University of Belfast & ECIT, United Kingdom); William G. Scanlon (Queen's University Belfast, United Kingdom)

F3-I.7 Optimized Wireless Power Transfer Schemes with Metamaterial-Based Resonators

Antonios G. Pelekanidis, Antonios X. Lalas, Nikolaos V. Kantartzis and Theodoros D. Tsiboukis (Aristotle University of Thessaloniki, Greece)

F3-I.8 Sensing Local Temperature and Conductivity Changes in a Brain Phantom Using Near-Field Microwave Radiometry

Evangelos Groupapas (National Technical University of Athens & Institute of Communications and Computer Systems, Greece); Maria Koutsoupidou (National Technical University of Athens, Greece); Irene Karanasiou (Hellenic Military University, Greece); Nikolaos Uzunoglu (National Technical University Athens, Greece)

F3-I.9 A Small Size Monopole UWB Antenna Used for Short Distance Wireless Baseband Transmission at High Data Rate

Furat Abayaje and Pascal Febvre (Université Savoie Mont Blanc, France)

F3-I.10 A High-gain Antenna with U-slot Using Zero-index Metamaterial Superstrate

Jianyu Lin (Shanghai Jiao Tong University, P.R. China); Dongying Li (Shanghai Jiaotong University, P.R. China)

F3-I.11 Near-Field Intensity Enhancement of a Nano-Antenna Above an Inverted Bragg Reflector

Ahmad Lutfi Torla (University of Sheffield, United Kingdom & International Islamic University Malaysia, Malaysia); Salam Khamas (University of Sheffield, United Kingdom)

F3-I.12 Design of Polarization Conversion Metasurface Based on Inverse Transformation Optics

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Lu Zhi, Zhan Zhang and Jun Hong Wang (Beijing Jiaotong University, P.R. China)

F3-II: Antenna Arrays, Beam-forming, MIMO, Signal processing in Antennas, Compressed sensing

F3-II.1 Design of Nonreciprocal Antenna Array

Tongfeng Guo and Qingfeng Zhang (South University of Science and Technology of China, P.R. China); Abhishek Kandwal and Rui Wang (Southern University of Science and Technology, P.R. China); Yifan Chen (The University of Waikato, New Zealand)

F3-II.2 Orbital Angular Momentum Reflectarray Antenna with Multiple Modes

Xingyu Lei (University of Electronic Science and Technology of China, P.R. China); Yu Jian Cheng (UESTC, P.R. China)

F3-II.3 Antenna Selection for MIMO Systems Using Biogeography Based Optimization

Konstantinos Fountoukidis (Aristotle University of Thessaloniki, Greece); Katherine Siakavara (Aristotle University, Greece); Christos Kalialakis (Centre Tecnologic de Telecomunicacions de Catalunya & EETT, Spain); Sotirios Goudos (Aristotle University of Thessaloniki, Greece)

F3-II.4 Bow-Tie Antenna for Underwater Wireless Sensor Networks

Konstantinos Alvertos (Kapodestrian University of Athens, Greece); Evangelia A Karagianni (Hellenic Naval Academy, Greece); Thomas Mpountas (School of Electrical and Computer Engineering, Greece); Dimitra I Kaklamani (National Technical University of Athens, Greece); Konstantinos Vardakis (Hellenic Naval Academy, Greece)

F3-II.5 kQ-product Analysis of Multiple-Receiver Inductive Power Transfer with Cross-Coupling

Reona Sugiyama (Graduate School of Information Science, Nara Institute of Science and Technology, Japan)

F3-II.6 Design of 4×4 Microstrip Quasi-Yagi Beam-steering Antenna Array Operation at 3.5GHz for Future 5G Vehicle Applications

Hongwei Wang and Guangli Yang (Shanghai University, P.R. China)

F3-II.7 Performance Comparison of Full-Dimension MIMO Systems with Different Base Station Places

Shun Nishizaki, Toshihiko Nishimura, Takeo Ohgane and Yasutaka Ogawa (Hokkaido University, Japan)

F3-II.8 Channel Capacity Estimation in the THz Band

Panagiotis Fytampanis, George Tsoulos, Georgia E. Athanasiadou and Dimitra Zarbouti (University of Peloponnese, Greece)

F3-III: Antenna Techniques, Broadband, Miniaturized & Small Antennas

F3-III.1 Active Steering Dielectric Resonator Antenna for Automotive

Tzu-Ling Chiu (Ethertronics and University of Limoges); Olivier Pajona (Ethertronics, France); Laure Huitema (Xlim Laboratory, France); Thierry Monediere (University of Limoges & CNRS, France); Laurent Desclos (Ethertronics, USA); Jaakko Kyllonen (Ethertronics, France)

F3-III.2 Efficiency Measurements of Additive Manufactured Electrically Small Antennas

Saad Mufti, Christopher Smith, Alan Tennant and Luke Seed (University of Sheffield, United Kingdom)

F3-III.3 Folded Dipole Antenna on Hemispherical PMC Shell for Helmet Antenna Design

Nobuhito Nomura, Naobumi Michishita and Hisashi Morishita (National Defense Academy, Japan)

F3-III.4 Gain Enhancement of Reactively Loaded Aperture Antennas

Ronis T. Maximidis and A. B. (Bart) Smolders (Eindhoven University of Technology, The Netherlands); Giovanni Toso (European Space Agency, The Netherlands); Diego Caratelli (The Antenna Company and Tomsk Polytechnic University)

F3-III.5 Electrically Small PCB Stack Hemispherical Helix Antenna with Air Core

Jeremy Ziegler, Ata Zadehgoal (University of Idaho, USA)

F3-III.6 Bandwidth Enhancement of A Multiport Double Notched Antenna Using the Network Characteristic Modes

Hussein Jaafar (Universté de Rennes1 & IETR, France); Sylvain Collardey (University of Rennes 1, France); Ala Sharaiha (Université de Rennes 1 & IETR, France)

Friday, March 3, 15:10 - 16:30, Plenary

Chairs: Sotirios Goudos (Aristotle University of Thessaloniki, Greece), Dimitrios Sounas (The University of Texas at Austin, USA)

15:10 The Orthogonal Methods for Antenna Arrays Beam-forming

John N. Sahalos (University of Nicosia, Cyprus & Aristotle University of Thessaloniki, Greece)

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15:50 **EM Band-Gap High Impedance Surfaces for Conformal Low-Profile Antennas and RCS Reduction**

Constantine A. Balanis (Arizona State University, USA)

16:30 ***Coffee Break***

Friday, March 3, 17:00 - 18:40

F4: Conformal, On-Chip and In-Package Antenna Systems

Chairs: John Papapolymerou (Michigan State University, USA), Atif Shamim (King Abdullah University of Science and Technology, Saudi Arabia)

17:00 **In-package Antennas Using Multilayer Organic and 3D Printing Technologies**

John Papapolymerou and Prem Chahal (Michigan State University, USA)

17:20 **Conformal Integration of Traveling-Wave Slot Antennas in Millimeter-Wave Regime**

Nghia Nguyen-Trong (University of Adelaide, Australia); Leonard Hall (Defence Science and Technology Organisation, Australia); Christophe Fumeaux (The University of Adelaide & School of Electrical and Electronic Engineering, Australia)

17:40 **Terahertz Conformal Antennas and Packaging**

Goutam Chattopadhyay (JPL, USA)

18:00 **Low-Cost Inkjet-Printed Wireless Sensor Nodes for Environmental and Health Monitoring Applications**

Muhammad Farooqui and Atif Shamim (King Abdullah University of Science and Technology, Saudi Arabia)

18:20 **Novel 3D-/Inkjet-Printed Flexible & 4D/Origami Reconfigurable RF Modules for Internet of Things and Smart Skin Applications**

Manos M. Tentzeris (Georgia Institute of Technology, USA)