

# **2015 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP 2015)**

**Suzhou, China  
1-3 July 2015**



**IEEE Catalog Number: CFP1577Y-POD  
ISBN: 978-1-4799-6451-2**

# Table of Content

A Novel Phase Shifting Surface-Integrated Horn Antenna	1
Magnetically Switchable Graphene Coupler and Application to a Magnetic Probe	4
Efficient ADE-FDTD Method for Modelling Graphene-Based Structures	7
Characterization of Multilayer Graphene Ribbon Based THz Resonators	10
A Beam-Steerable Metamaterial Lens Using Varactor Diodes	13
Polarization-insensitive Electro-Optic Switching in Terahertz MEMS Metamaterial	16
Integrated Antenna with a Via-Hole Balun and Hairpin Resonator Narrow Band Pass Filter for Microwave Communications	19
Dual-band GaN power amplifiers with novel DC biasing networks incorporating offset DSPSL	25
Ultra-wideband Polarization Conversion Metasurface Based on Topology Optimal Design and Geometry Tailor	29
Compact SIW Microstrip Magnetic Yagi Antenna	32
A Miniaturized Differentially Fed Dual-Band Fractal Antenna for In-Body Communications	35
Broadband Temperature-Dependent Dielectric Properties of Polycrystalline Vanadium Dioxide Thin Films	38
A Terahertz Quasi-optical Detector Based on a 3D Printing Lens	41
Low-loss Y-Junction two-dimensional magneto-photonics circulator using a ferrite cylinder	44
Simulation of a Novel Flip-chip Antenna in THz Region	47
3-D Near-field Millimeter Wave imaging based on Stepped Frequency System	50
Balun Bandpass Filter with Wide Upper Stopband Using Silicon-Based Integrated Passive Device Technology	53
A Systematic Test Approach for Through-Silicon Via (TSV) Process	56
Experimental 0.2THz Radar System for RCS Measurement	59
Terahertz superradiation with a cylindrical surface wave structure within a 3-mirror quasi-optical cavity	62
A Terahertz Diagonal Multi-layer Horn Antenna Based on MEMS Technology	65
Analysis of trapping effect in GaN HEMT Modeling	68
A New Optimization Based Parasitic Parameters Extraction Method for GaN HEMT with Asymmetrical Channel Structure	71
Design of a 2.4GHz Polar Power Amplifier	74
High Power S-band GaN-based Power Amplifier for Radar Systems	77
Permittivity Extraction from On-wafer Scattering Parameters at Microwave Frequency Based on Electromagnetic Modeling	80
RF Performance Evaluation of Microstrip Lines Printed on Flexible Polyethylene Terephthalate (PET) Films	83
Surface Head Coil for 10.5 Tesla Magnetic Resonance Imaging (MRI)	86
A Compact Substrate Integrated Spiral Resonator for Wireless Power Transfer	89

Gbps THz external modulator based on the high electron mobility transistor-metamaterial	92
Harmonics Generation, Saturable Absorption and Other Nonlinear Phenomena in Graphene	95
Microwaves and Low Dimension Carbon: Characterisation and Applications	98
A Broadband Free-space Dielectric Measurement System	101
A Novel Tunable High Impedance Surface Electromagnetic Band Gap Metamaterials for RF and Microwave Applications	104
Circular dichroism in planar achiral metamaterial	107
A Horizontally Polarized 360-Degree Radiation Pattern Steerable Antenna Based on Active Frequency Selective Surface	110
Graphene-silicon Diode Loaded Patch Antenna	113
Axial Ratio Enhanced Wideband Circularly Polarized Aperture Antenna with Corner-Truncated AMC Reflector	116
Mutual Coupling Reduction of Dual-frequency Patch Antenna Arrays	119
A wideband Implantable Antenna with Circularly Polarization	122
Research on Terahertz Science and Engineering at the State Key Laboratory of Millimeter Waves, Partner Laboratory in City University of Hong Kong	125
Near-Field Characteristics of Focused Transmitarray Antennas	126
Novel Space, Time and Space-Time Processing Materials and Devices for RF-THz Applications	129
Analytical Green's function for tip-sample interaction in microwave impedance microscopy	132
Synthesis of Graphene and Other 2D Materials: The Past and Future of Chemical Vapor Deposition	135
Modeling of Magnetically Biased Graphene Patch Frequency Selective Surface (FSS) for THz Applications	138
Phosphorene MOSFETs – Promising Transistors Based on a few Layers of Phosphorus Atoms	141
Ultraviolet Beam Focusing by Surface Plasmon Polaritons in Gallium Arsenide With a Groove Array Structure	144
Double-layer resistive FSS structure for ultra-wideband microwave absorption	147
Mutual Coupling Reduction of Microstrip Antenna Array Using Metamaterial Absorber	150
Approaches to Design of Fishnet Metamaterial Structures Using RTLM Equivalent Circuit Theory	153
Influence of packaging materials on GaN RF power devices	156
Microwave Wide Bandgap GaN High Electron Mobility Transistor Development and its Monolithic Integrated Circuits	159
GaN Device and Modeling with Emphasis on Trapping Effect and Thermal Challenges	162
AlGaN/GaN HEMT Development Targeted for S-band Application	165
Tunable and Flexible Electronics Employing Monolithically-Integrated BST Thin film	168
Tunable Power Divider Based on Coupled Resonator with High-Selectivity Filtering Response	171
A Novel RF-MEMS Shunt Capacitive Switch Design for Dielectric Charging Mitigation	174
The Tunable Properties of Mn doped (Ba,Sr)TiO <sub>3</sub> Thin Film Varactor at Low Temperature.	177
Ferrite-loaded Substrate Integrated Waveguide Frequency-Agile Bandpass Filter	180
Micromachined 3D Millimeter-Wave and Terahertz Devices	183

Modeling of TSV-Based Solenoid Inductors for 3-D Integration	186
Novel hybrid coupling structure for HMSIW resonators and its application to bandpass filter	189
Frequency- and Beam-Reconfigurable THz Fabry-Perot Antenna Based on Hybrid Cu-Graphene High-Impedance Surface	192
A YBCO/BST/MgO Interdigital Varactor and an L-band Tunable HTS Bandpass Filter	195
A Reconfigurable 07-2.6GHz Wideband Mixer for Multi-mode Multi-standard Receivers in 0.18um RF CMOS	198
Wideband and Low power OOK CMOS transmitter and receiver for Wireless chip-to-chip communication	201
An Energy Efficient Multi-channelled Sub-THz I/O with SRR Modulator and SPP Interconnect	204
Novel On-Chip Passive Circuits for RF, Microwave, Millimeter-Wave and Sub-THz Applications	207
The design of a high gain on-chip antenna for SoC application	212
A New Two-dimensional Material: Phosphorene	215
Plasmonic Beam Control in Strongly Coupled Graphene Sheet Arrays	216
High performance photodetectors based on two-dimensional materials	217
A Novel Symmetric Weighted Thinned Array with Pattern Reconfigurable Antenna to Achieve Wide-Angle Scanning with Super-Low Side Lobe	220
A Compact Artificial Transmission Line Structure Using LTCC Technology and Its Application	224
Dual-polarized Textile Antenna Integrated in the Three Dimensional Orthogonal Woven Fabrics	227
A Novel Ultrawideband Planer Antenna Design with Tunable Band-Notch Characteristics	230
High Gain Bat Shape Antenna for IEEE 802.11a	233
A Differentially-Driven Rectifier for Enhanced RF Power Harvesting	237
Experimental Study on 340GHz Wave Material Penetration Attenuation Properties	240
Temperature and doping dependence of the optical properties of silicon at terahertz frequencies	243
Planar Terahertz Functional Materials Based on Metallic Array Structures	246
Design and Verification of a Tri-reflector CATR System at 300GHz	249
Subwavelength prestressed microcantilevers based metamaterials for efficient manipulation of terahertz waves	252
RF and THz detection using two dimensional materials on flexible substrates	255
3D Printing Millimeter-Wave Lens with Scanning Beams	256
A Rapid Antenna Prototyping Method by Evolutionary Computation and Inkjet Printing	258
Status and Challenges of Inkjet Printed RF and THz Structures	261
Multi-layer Corrugated Terahertz Horn Antenna Based on MEMS Technology	263
Ultrathin Metasurface based on phase discontinuity with Maximal Cross-Polarization Efficiency	266
RCS Reduction by Metasurface with Random Distribution of Reflection Phases	269
Broadband Planar Luneburg Lens Composed of Artificial Impedance Surfaces	272
Dynamic co-polarization decoupling method using tunable resonators	275
Scattering in Spatiotemporal Media	278
Enhanced GaN HEMT Large Signal Model with Self-Heating & Trapping Effects	281

0.5THz Common Base Four-finger InGaAs/InP DHBT	284
A Novel Extraction Approach of Extrinsic and Intrinsic Parameters of InGaAs/GaN pHEMTs	287
Influence of Surface/Interface Stress on Thermal Conductivity of Stressed GaN Nanofilms	290
Transformer-Based Dual-Mode VCO for Multi-mode Multi-standard Receiver	293
Guiding and Focusing of Spoof Surface Plasmon Polaritons on Conical Metal Wire with Periodically Helical Grooves	296
The RCS reduction of microstrip antenna design based on multi-band metamaterial absorber	300
Simplified Superscatterers with Homogeneous and Isotropic Anti-vacuum Materials	303
Shape Trapped-Mode Resonances in Polarization Conversion Metasurfaces for Ultra-sensitive Terahertz Sensing	306
A Novel Beam Shaped Microstrip Patch Antenna by Metamaterial Units	309
Broadband band-pass FSS using patch-wire-patch coupled structures	312
Visual graphic representation method design of non-magnetic single layer metamaterial absorbers	315
Analysis and Modeling of a broad-band CPW to Slotline Transition in THz Frequency	318
Wideband Radar Cross Section Reduction Covering X and Ku Band Using Artificial Magnetic Conductor Structures	321
Realizability Analysis of Wideband Non-Equiripple Bandpass Filters Using Parallel-Coupled Lines	324
An Enhancement of the ZigBee Wireless Sensor Network Using Bluetooth for Industrial Field Measurement	326
Study of Miniaturized Tri-band Combined-element Frequency Selective Surface (CEFSS)	329
A Compact CSRR- based Dual-mode Patch Bandpass Filter	332
Wideband RCS Analysis of PEC Objects by Combining FMIR-MoM with Barycentric Subdivision-based Quadrature Technique	335
Hybrid Coaxial/Substrate Integrated Waveguide Eight-Way Power Divider	338
A Compact and Dual-Band Circularly Polarized Petal-Shaped Antenna With Broad Beamwidth for Multiple Global Navigation Satellite Systems	341
Circularly Polarized Printed Dipole Antenna Based On High Impedance Surface	344
Design of Dual-Polarized Differential Feed Dielectric Resonator	347
Plasmonic Absorption Enhancement in Periodic Cross-shaped Graphene Arrays	350
Aperture Coupled Microstrip Antenna with Extremely Low Profile	351
A Wideband Slot Antenna for Mobile Phone Applications	354
Fast Simulation of Microwave Devices via a Data-sparse and Explicit CN-FETD Method	357
Analysis of Tunable Multi-Walled Carbon Nanotube (MWCNT) Based Resonator	360
A X-Band High Power Rectangular Waveguide Bidirectional Coupler's Design	363
A Novel Central-Stub-Loaded, Dual-Band Bandpass Filter for PCS and WiMAX Application	366
Closed-Form Expressions for the Capacitance of Tapered Through-Silicon Vias	369
Miniaturized Bandpass Filter With High Frequency Selectivity and Wide Upper Stopband	373
An Interdigitated Coupler with Defect Ground Structure	376

Modeling Tunable Graphene-Based Filters Using Leapfrog ADI-FDTD Method	379
An ultra-wideband Y-splitter based on the ultrathin plasmonic metamaterials	382
A Palladium Decorated Signal Walled Carbon Nanotube Enabled Chipless Sensor for Detecting Methane at Room Temperature Based on UWB-RFID System	385
A Low-Profile Aperture Impedance Matching Technique for TEM Planar Luneberg Lens	388
Wideband Slotline-Ring-Resonator Bandpass Filters Under Triple Resonances	391
An Improved Equivalent Circuit Model for C/D CRLH TL Metamaterials	394
Perfectly Matched Layer for Hybrid Implicit and Explicit-FDTD Method	397
Study on the multiple-path characteristics of radio wave in indoor corridor environment	400
Substrate Integrated Waveguide(SIW) 3-dB Narrow Wall Directional Couplers for Monopulse Comparator Application	403
Tunable Planar Left-Handed Metamaterials Based on Split-Ring Resonator Pairs	407
Novel Polarization Independent and Angle Consistency Absorber Based on Metal-Dielectric Metamaterial	410
Reflectionless lossy Metasurface for Full Control of Electromagnetic Wave Transmission	413
Manipulating Electromagnetic Local Density of States by Graphene Plasmonics	414
The Design and Implementation of a Compact NMR System	417
Graphene-loaded Reconfigurable CPW Interdigital Capacitors	420
Circuit Modeling of CuCNT Composite Through-Silicon Vias (TSV)	422
Graphene-aluminum oxide metamaterial for a compact polarization-independent modulator	425
Generation of THz Wave with Orbital Angular Momentum by Graphene Patch Reflectarray	428
A Short-Open Calibration (SOC) Technique to Calculate the Propagation Characteristics of Substrate Integrated Waveguide	431
Scalable modeling with simple topology for stacked millimeter-wave transformers	434
Investigation of Planar Wide Band Quadruple-mode Filter Based on Substrate Integrated Waveguide	437
Fabrication of dual-passband frequency selective surface utilizing complementary structure	440
Design of a 0.7~1.5 GHz Wideband Power Amplifier in 0.18- $\mu$ m CMOS Process	443
InGaAs/InP Double Heterojunction Bipolar Transistors with $f_{max}=532$ GHz	446
Two beam steering lenses enabled by metamaterials	449
Analysis on the Transmission Phase Response of the E-IT and M-IT Meta-structures	452
Integrated RFIC On-Chip and GPS Antenna with Human Body for Wrist and Wearable Communication Applications	455
Passive Wireless Gas Sensor Based on LTCC Technique	462
Microwave Dielectric Properties of $5\text{Li}_2\text{O}-(\text{Nb}_{1-x}\text{M}_x)_2\text{O}_5-5\text{TiO}_2$ (M=Mo, W, $0<x<0.2$ ) Ceramics	465
Lowpass filter with sharp roll-off and wide stopband using LTCC technology	468
High Performance Low Temperature Sintered Microwave Dielectric Ceramics Prepared by Solid-State Reaction	471
Minimization of Wideband LTCC Bandpass Filter Using QMSIW and EMSIW Cavities	474