



BERARDI SENSALÉ
RODRIGUEZ

Dr.

berardi.sensale@utah.edu
<https://terahertzoptoelectronics.org/>

50 S. Central Campus Dr., Rm. 2110 ; Salt Lake City, UT 84112
801-585-5657

SNI

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información
Categorización actual: Nivel II (Asociado)

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Última actualización: 23/12/2019

Datos Generales

INSTITUCIÓN PRINCIPAL

University of Utah / Estados Unidos

DIRECCIÓN INSTITUCIONAL

Institución: University of Utah / Sector Extranjero/Internacional/Otros
Dirección: 50 S. Central Campus Dr., Rm. 2110 / 84112 / Salt Lake City , Estados Unidos
Teléfono: (1) 8015855657
Correo electrónico/Sitio Web: berardi.sensale@utah.edu <https://faculty.utah.edu/~bsensale>

Formación

Formación académica

CONCLUIDA

DOCTORADO

Electrical Engineering (2009 - 2013)

Univ. of Notre Dame , Estados Unidos
Título de la disertación/tesis/defensa: Novel Terahertz Devices Based on Tunable 2DEG Systems
Tutor/es: Huili Grace Xing
Obtención del título: 2013
Sitio web de la disertación/tesis/defensa: <http://etd.nd.edu/ETD-db/theses/available/etd-04182013-113243/>
Palabras Clave: THz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

GRADO

Ingeniería Eléctrica (2003 - 2008)

Universidad de la República - Facultad de Ingeniería - UDeLaR , Uruguay
Título de la disertación/tesis/defensa: Desarrollo de un pez robótico autónomo
Tutor/es: Rafael Canetti
Obtención del título: 2008
Palabras Clave: Robótica Electrónica
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Idiomas

Español

Entiende muy bien / Habla muy bien / Lee muy bien / Escribe muy bien

Francés

Entiende bien / Habla regular / Lee bien / Escribe regular

Inglés

Entiende muy bien / Habla muy bien / Lee muy bien / Escribe muy bien

Portugués

Entiende muy bien / Habla muy bien / Lee muy bien / Escribe muy bien

Áreas de actuación

INGENIERÍA Y TECNOLOGÍA

Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

INGENIERÍA Y TECNOLOGÍA

Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional

INGENIERÍA Y TECNOLOGÍA

Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Control Automático y Robótica

INGENIERÍA Y TECNOLOGÍA

Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Métodos Numéricos - Electromagnetismo Computacional

CIENCIAS NATURALES Y EXACTAS

Ciencias Físicas / Física de los Fluidos y Plasma

INGENIERÍA Y TECNOLOGÍA

Nanotecnología / Nano-materiales

Actuación profesional

SECTOR EXTRANJERO/INTERNACIONAL/OTROS - ESTADOS UNIDOS

University of Utah

VÍNCULOS CON LA INSTITUCIÓN

Funcionario/Empleado (07/2013 - a la fecha) Trabajo relevante

Associate Professor ,40 horas semanales / Dedicación total

SECTOR EDUCACIÓN SUPERIOR/PÚBLICO - UNIVERSIDAD DE LA REPÚBLICA - URUGUAY

Facultad de Ingeniería - UDeLaR

VÍNCULOS CON LA INSTITUCIÓN

Funcionario/Empleado (09/2008 - 07/2016)

Asistente (Instituto de Matemática) ,20 horas semanales

Escalafón: Docente

Grado: Grado 2

Cargo: Efectivo

Funcionario/Empleado (07/2007 - 07/2013)

Ayudante (Instituto de Ingeniería Eléctrica) ,20 horas semanales

Escalafón: Docente

Grado: Grado 1

Cargo: Interino

Funcionario/Empleado (03/2005 - 09/2008)

Ayudante (Instituto de Matemática) ,20 horas semanales

Escalafón: Docente

Grado: Grado 2

Cargo: Interino

SECTOR EXTRANJERO/INTERNACIONAL/ENSEÑANZA SUPERIOR - ESTADOS UNIDOS

University of Notre Dame

VÍNCULOS CON LA INSTITUCIÓN

Funcionario/Empleado (09/2009 - 05/2013)

Electrical Engineering Departmental Fellow ,20 horas semanales

CARGA HORARIA

Carga horaria de docencia: 5 horas

Carga horaria de investigación: 10 horas

Carga horaria de formación RRHH: 15 horas

Carga horaria de extensión: 5 horas

Carga horaria de gestión: 5 horas

Producción científica/tecnológica

Dr. Sensale-Rodriguez is a tenured Associate Professor at the University of Utah, with an appointment with the Department of Electrical & Computer Engineering. He joined the faculty at the University of Utah in 2013, after earning his Ph.D. in Electrical Engineering from the University of Notre Dame (UND). During his research career, he has received the National Science Foundation (NSF) CAREER Award, the ECE department outstanding teaching award, the Eli J. and Helen Shaheen Graduate School Award in Engineering at UND, and the Best Student Paper Award at the 37th International Conference on Infrared, Millimeter and Terahertz Waves (IRMMW-THz). Sensale-Rodriguez's research and teaching interests are in the broad areas of (a) applied electromagnetics and (b) electronic & optoelectronic devices and materials. His research projects involve: (i) simulation and design of electronic and photonic devices, in particular employing emerging materials, (ii) growth, fabrication and characterization of electronic & optical materials and devices, (iii) system integration of these devices.

He is the author or co-author of 52 journal articles, 63 conference proceeding papers, 6 book chapters, 100+ conference presentations, and delivered 20+ invited talks and seminars. His h-index is 20 with 2,500+ citations according to Google Scholar. He serves as a member of the editorial board for Scientific Reports (Nature Publishing Group) and Nano Communication Networks (Elsevier). He currently advises three graduate students and three postdoctoral scholars, co-advises a few graduate students, and has mentored several undergraduate students. He is the faculty advisor for the student chapters of the Society of Hispanic Professional Engineers (SHPE) and the SPIE. He also serves as Director of graduate Studies in the ECE department. Since joining the University of Utah, his research efforts have been supported by about \$4.7M in external research funding, with Sensale-Rodriguez's share ~\$2.4M.

Producción bibliográfica

ARTÍCULOS PUBLICADOS

ARBITRADOS

Ultra-thin Near Infrared camera enabled by a flat multi-level diffractive lens (Completo, 2019)

SENSALE RODRIGUEZ, B.

Optics Letters, 2019

ISSN: 01469592

BANERJI, S.; MEEM, M.; MAJUMDER, A.; VASQUEZ, F.G.; SENSALÉ-RODRIGUEZ, B.; MENON, R.; ?Ultra-thin Near Infrared camera enabled by a flat multi-level diffractive lens.? Optics Letters, 44(22), 5450-5452, 2019. <https://www.osapublishing.org/ol/abstract.cfm?uri=ol-44-22-5450>

Scopus' WEB OF SCIENCE"

Imaging with flat optics: metalenses or diffractive lenses? (Completo, 2019)

SENSALE RODRIGUEZ, B.

Optica, 2019

ISSN: 23342536

BANERJI, S.; MEEM, M.; MAJUMDER, A.; VASQUEZ, F.G.; SENSAL-RODRIGUEZ, B.; MENON, R.; ?Imaging with flat optics: metalenses or diffractive lenses??.? Optica, vol. 6, p. 805-810, 2019.

<https://www.osapublishing.org/optica/abstract.cfm?uri=optica-6-6-805>

Scopus®

A Computational Design Framework for Efficient, Fabrication Error-Tolerant, Planar THz Diffractive Optical Elements (Completo, 2019)

SENSALE RODRIGUEZ, B.

Scientific Reports, 2019

ISSN: 20452322

BANERJI, S.; SENSAL-RODRIGUEZ, B.; ?A Computational Design Framework for Efficient, Fabrication Error-Tolerant, Planar THz Diffractive Optical Elements,? Scientific Reports, vol. 9, p. 5801, 2019. <https://www.nature.com/articles/s41598-019-42243-5>

Scopus® WEB OF SCIENCE™

Manifestation of Kinetic-Inductance in Terahertz Plasmon Resonances in Thin-Film Cd3As2 (Completo, 2019)

SENSALE RODRIGUEZ, B.

ACS Nano, 2019

ISSN: 19360851

CHANANA, A.; LOTFIZADEH, N.; CONDORI, H.; GOPALAN, P.; WINGER, J.; BLAIR, S.; NAHATA, A.; DESHPANDE, V.; SCARPULLA, M.; SENSAL-RODRIGUEZ, B.; ?Manifestation of Kinetic-Inductance in Terahertz Plasmon Resonances in Thin-Film Cd3As2,? ACS Nano, vol. 13, p. 4091, 2019. <https://pubs.acs.org/doi/10.1021/acsnano.8b08649>

Scopus® WEB OF SCIENCE™

Broken symmetry effects due to polarization on resonant tunneling transport in double-barrier nitride heterostructures (Completo, 2019)

SENSALE RODRIGUEZ, B.

Physical Review Applied, 2019

ISSN: 23317019

ENCOMENDERO, J.; PROTASENKO, V.; SENSAL-RODRIGUEZ, B.; FAY, P.; RANA, F.; JENA, D.; XING, H. G., ?Broken symmetry effects due to polarization on resonant tunneling transport in double-barrier nitride heterostructures,? Phys. Rev. Applied, vol. 11, p. 034032, 2019.

<https://journals.aps.org/prapplied/accepted/>

Scopus® WEB OF SCIENCE™

Ultrafast THz Modulators with WSe2 thin films (Completo, 2019)

SENSALE RODRIGUEZ, B.

Optical Materials Express, 2019

Escrito por invitación

ISSN: 21593930

GOPALAN, P.; CHANANA, A.; KRISHNAMOORTHY, S.; NAHATA, A.; SCARPULLA, M.; SENSAL-RODRIGUEZ, B., ?Ultrafast THz Modulators with WSe2 thin films,? Optical Materials Express, vol. 9, pp. 826-836, 2019. <https://doi.org/10.1364/OME.9.000826>

Scopus® WEB OF SCIENCE™

Two-dimensional Materials for Terahertz Modulation (Completo, 2019)

SENSALE RODRIGUEZ, B.

Advanced Optical Materials, 2019

Escrito por invitación

ISSN: 21951071

GOPALAN, P.; SENSAL-RODRIGUEZ, B.; ?Two-dimensional Materials for Terahertz Modulation,? Advanced Optical Materials, 201900550, 2019. <https://doi.org/10.1002/adom.201900550>

Scopus® WEB OF SCIENCE™

Single flat lens enabling imaging in the short-wave infra-red (SWIR) band (Completo, 2019)

BANERJI, S., MEEM, M., MAJUMDER, A., DVONCH, C., SENSAL RODRIGUEZ, B., MENON, R. OSA Continuum, v.: 2 10, p.:2968 2019

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 25787519

BANERJI, S.; MEEM, M.; MAJUMDER, A.; DVONCH, C.; SENSAL-RODRIGUEZ, B.; MENON, R.; ? Single flat lens enabling imaging in the short-wave infra-red (SWIR) band,? OSA Continuum, vol. 2, no. 10, p. 2968, 2019. <https://doi.org/10.1364/OSAC.2.002968>

Broadband lightweight flat lenses for long wave-infrared imaging (Completo, 2019)

MEEM, M. , BANERJI, S. , MAJUMDER, A. , GUEVARA-VASQUEZ, F. , SENSAL RODRIGUEZ, B. , MENON, R.

Proceedings of the National Academy of Sciences of the United States of America, v.: 116 43 , p.:21375 2019

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Físicas / Óptica, Acústica /

Medio de divulgación: Internet

ISSN: 00278424

MEEM, M.; BANERJI, S.; MAJUMDER, A.; VASQUEZ, F.G.; SENSAL-RODRIGUEZ, B.; MENON, R.; ?Broadband lightweight flat lenses for long wave-infrared imaging,? PNAS, 116(43), 21375-21378, 2019. <https://doi.org/10.1073/pnas.1908447116>

Scopus® WEB OF SCIENCE™

Incident wavelength and polarization dependence of spectral shifts in α -Ga₂O₃ UV photoluminescence?, (Completo, 2018)

SENSAL RODRIGUEZ, B.

Scientific Reports, 2018

ISSN: 20452322

WANG, Y.; DICKENS, P.; VARLEY, J.; NI, X.; LOTUBAI, E.; SPRAWLS, S.; LIU, F.; LORDI, V.; KRISHNAMOORTHY, S.; BLAIR, S.; LYNN, K.; SCARPULLA, M.; SENSAL-RODRIGUEZ, B.; ? Incident wavelength and polarization dependence of spectral shifts in α -Ga₂O₃ UV photoluminescence?, Scientific Reports, vol. 8, p. 18075, 2018.

<https://www.nature.com/articles/s41598-018-36676-7>

Scopus® WEB OF SCIENCE™

Graphene-dielectric integrated THz metasurfaces (Completo, 2018)

SENSAL RODRIGUEZ, B.

Semiconductor Science and Technology, 2018

Escrito por invitación

ISSN: 02681242

AREZOOMANDAN, S.; CONDORI, H.; CHANANA, A.; GOPALAN, P.; BANERJI, S.; NAHATA, A.; SENSAL-RODRIGUEZ, B., ?Graphene-dielectric integrated THz metasurfaces,? Semiconductor Science & Technology, vol. 33, no. 10, p. 104007, 2018. <https://doi.org/10.1088/1361-6641/aade65>

Scopus® WEB OF SCIENCE™

Comparison of unit cell coupling for grating?gate and high electron mobility transistor array THz resonant absorbers (Completo, 2018)

SENSAL RODRIGUEZ, B.

Journal of Applied Physics, 2018

ISSN: 00218979

CONDORI, H.; CHANANA, A.; ENCOMENDERO, J.; ZHU, M.; TROMETER, N.; NAHATA, A.; XING, H. G.; SENSAL-RODRIGUEZ, B., ?Comparison of unit cell coupling for grating?gate and high electron mobility transistor array THz resonant absorbers,? Journal of Applied Physics, vol. 124, p. 09301, 2018. <https://aip.scitation.org/doi/10.1063/1.5032102>

Scopus® WEB OF SCIENCE™

THz characterization and demonstration of visible-transparent / terahertz-functional electromagnetic structures in ultra-conductive La-doped BaSnO₃ Films (Completo, 2018)

SENSAL RODRIGUEZ, B.

Scientific Reports, 2018

ISSN: 20452322

AREZOOMANDAN, S.; PRAKASH, A.; CHANANA, A.; YUE, J.; MAO, J.; BLAIR, S.; NAHATA, A.; JALAN, B.; SENSAL-RODRIGUEZ, B., ?THz characterization and demonstration of visible-transparent / terahertz-functional electromagnetic structures in ultra-conductive La-doped BaSnO₃ Films,? Scientific Reports, vol. 8, p. 3577, 2018. <https://www.nature.com/articles/s41598-018-22038-w>

Scopus' WEB OF SCIENCE"

New tunneling features in polar III-nitride resonant tunneling diodes (Completo, 2017)

SENSAL RODRIGUEZ, B.

Physical Review X, 2017

ISSN: 21603308

ENCOMENDERO, J.; FARIA, F.; ISLAM, S.M.; PROTASENKO, V.; ROUVIMOV, S.; SENSAL-RODRIGUEZ, B.; FAY, P.; JENA, D.; XING, H. G., ?New tunneling features in polar III-nitride resonant tunneling diodes,? Physical Review X, vol. 7, p. 041017, 2017.

<https://doi.org/10.1103/PhysRevX.7.041017>

Scopus' WEB OF SCIENCE"

Terahertz magneto-plasmonics using cobalt subwavelength aperture arrays (Completo, 2017)

SENSAL RODRIGUEZ, B.

Scientific Reports, 2017

ISSN: 20452322

GUPTA, B.; PANDEY, S.; NAHATA, A.; SENSAL-RODRIGUEZ, B.; GURUSWAMY, S.; NAHATA, A., ?Terahertz magneto-plasmonics using cobalt subwavelength aperture arrays,? Scientific Reports, vol. 7, p. 120719, 2017. <https://www.nature.com/articles/s41598-017-12369-5>

Scopus' WEB OF SCIENCE"

Terahertz spectroscopy of an electron-hole bilayer system in AlN/GaN/AlN quantum wells (Completo, 2017)

SENSAL RODRIGUEZ, B.

Applied Physics Letters, 2017

ISSN: 00036951

CONDORI, H.; ISLAM, S.M.; BADER, S.; CHANANA, A.; LEE, K.; CHAUDHURI, R.; NAHATA, A.; XING, H. G.; JENA, D.; SENSAL-RODRIGUEZ, B., ?Terahertz spectroscopy of an electron-hole bilayer system in AlN/GaN/AlN quantum wells,? Applied Physics Letters, vol. 111, no. 7, p. 073102, 2017. <http://dx.doi.org/10.1063/1.4996925>

Scopus' WEB OF SCIENCE"

A Continuous Compact DC Model for Dual-Independent-Gate FinFETs (Completo, 2017)

HASAN, M., GAILLARDON, P.-E., SENSAL RODRIGUEZ, B.

IEEE Journal of the Electron Devices Society, v.: 4 2017

Palabras clave: feedback FinFET subthreshold slope compact model

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electronica

Medio de divulgación: Internet

ISSN: 21686734

<http://dx.doi.org/10.1109/JEDS.2016.2632709>

Multiple-Independent-Gate (MIG) silicon FinFETs were recently shown capable of enabling (i) device-level polarity control, (ii) dynamic threshold modulation and (iii) subthreshold slope tuning down to ultra-steep-slope operation. These operation mechanisms can unlock a myriad of opportunities in digital as well as analog design. Here we discuss a continuous compact direct-current (DC) model, capable of describing the current-voltage characteristics of a class of MIG FinFETs, namely Dual-Independent-Gate (DIG) FinFETs, over all its biasing design space. This model captures some of the unique features of DIG FinFETs including the dependence of its super-steep subthreshold swing on drain bias and polarity gate bias. An excellent agreement is shown between the model and measured experimental current-voltage characteristics in these devices. Moreover, the predictive nature of the model is evaluated by foreseeing the perspectives of DIG FinFETs as efficient RF detectors at very high frequencies.

Scopus'

Graphene-based reconfigurable terahertz plasmonics and metamaterials (Completo, 2017)

Trabajo relevante

AREZOOMANDAN, S., CONDORI, H., RAMNEY, N., NIEVES, C., SENSAL RODRIGUEZ, B.

Carbon, v.: 112 p.:177 - 184, 2017

Palabras clave: graphene plasmonics terahertz metamaterials

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electromagnetismo

Medio de divulgación: Internet

ISSN: 00086223

<http://dx.doi.org/10.1016/j.carbon.2016.11.015>

This work discusses and compares two proposed practical approaches for realizing graphene-based reconfigurable terahertz metamaterials, namely: graphene-only plasmonic structures, and graphene/metal hybrid structures. From rigorous theoretical analysis, full-wave electromagnetic numerical simulations, as well as supporting experiments, several reconfigurable structures are analyzed and compared in terms of their: (i) Quality-factor, (ii) Extinction-ratio, (iii) Unit-cell dimensions, and (iv) Resonance-frequency tunability-range. From this analysis it is observed that at terahertz frequencies, although typically possessing larger unit-cell dimensions and being limited by a restricted resonance-frequency tunability-range, reconfigurable metamaterials based on graphene/metal hybrid structures can provide much larger quality-factors, extinction levels, and, when reconfigured, smaller extinction-level degradation than graphene-only plasmonic structures. As a result, when analyzed in the context of reconfigurable terahertz metamaterials, graphene might result attractive as a reconfigurable media providing tunability to otherwise passive metallic structures rather than as a reconfigurable plasmonic material per-se.

Scopus® WEB OF SCIENCE™

Tunable Terahertz Metamaterials Employing Layered 2D-materials Beyond Graphene (Completo, 2017)

AREZOOMANDAN, S., GOPALAN, P., TIAN, K., CHANANA, A., NAHATA, A., TIWARI, A., SENSEALE RODRIGUEZ, B.

IEEE Journal of Selected Topics in Quantum Electronics, v.: 23 1, 2017

Palabras clave: terahertz metamaterials MoS2

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electromagnetismo

Medio de divulgación: Internet

Escrito por invitación

ISSN: 1077260X

<http://dx.doi.org/10.1109/JSTQE.2016.2616839>

In this study, we extend recent investigations on graphene/metal hybrid tunable terahertz metamaterials to other two-dimensional (2-D) materials beyond graphene. For the first time, use of a nongraphitic 2-D material, molybdenum disulfide (MoS₂), is reported as the active medium on a terahertz metamaterial device. For this purpose, high-quality few atomic layer MoS₂ films with controlled numbers of layers were deposited on host substrates by means of pulsed laser deposition methods. The terahertz conductivity swing in those films is studied under optical excitation. Although no-appreciable conductivity modulation is observed in single-layer MoS₂ samples, a substantial conductivity swing, i.e., 0 to ~0.6 mS, is seen in samples with ~60 atomic layers. Therefore, although exhibiting much smaller maximum terahertz conductivity than that in graphene, which is a consequence of much smaller carrier mobility, MoS₂ can still be employed for terahertz applications by means of utilizing multilayer films. With this in mind, we design and demonstrate optically actuated terahertz metamaterials that simultaneously exhibit a large modulation depth (i.e., >2× larger than the intrinsic modulation depth by a bare MoS₂ film) and low insertion loss (i.e., <3 dB). The advantages of using a 2-D material with a bandgap, such as MoS₂, rather than a gapless material, such as graphene, are: 1) a reduced insertion loss, which is owed to the possibility of achieving zero minimum conductivity, and 2) an enhanced modulation depth for a given maximum conductivity level, which is due to the possibility of placing the active material in a much closer proximity to the metallic frequency selective surface, thus allowing us to take full advantage of the near-field enhancement. These results indicate the promise of layered 2D materials beyond graphene for terahertz applications.

Scopus® WEB OF SCIENCE™

Graphene terahertz devices for communications applications (Completo, 2016)

HASAN, M., AREZOOMANDAN, S., CONDORI, H., SENSEALE RODRIGUEZ, B.

Nano Communication Networks, v.: 10 p.:68 - 78, 2016

Palabras clave: graphene terahertz communications

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica / Electronica

Medio de divulgación: Internet

ISSN: 18787789

<http://dx.doi.org/10.1016/j.nancom.2016.07.011>

The extraordinary electronic, thermal and optical properties of graphene, together with its two dimensional nature, and with the possibility of facile integration, have enabled its application into a new generation of high-performance devices capable of extending the performance of existing terahertz communications technologies. Although promising for wireless communications applications, the terahertz region of the spectrum, i.e. the frequency range between 300 GHz and 10 THz, is in fact still characterized by a lack of efficient, compact, solid state components capable of operating at room temperature. In this regard, graphene-based terahertz components have shown very promising results in terms of modulation, detection, as well as generation of terahertz waves. This paper will review and discuss recent progress on graphene based devices for modulation, detection and generation of terahertz waves, which are among the key components for future terahertz band communications systems.

Scopus*

Terahertz amplification in RTD-gated HEMTs with a grating-gate wave coupling topology (Completo, 2016)

CONDORI, H., ENCOMENDERO, J., XING, H. G., SENSALE RODRIGUEZ, B.

Applied Physics Letters, v.: 109 2016

Palabras clave: HEMT terahertz amplification

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electronica

Medio de divulgación: Internet

ISSN: 00036951

<http://scitation.aip.org/content/aip/journal/apl/109/6/10.1063/1.4961053>

We theoretically analyze the operation of a terahertz amplifier consisting of a resonant-tunneling-diode gated high-electron-mobility transistor (RTD-gated HEMT) in a grating-gate topology. In these devices, the key element enabling substantial power gain is the efficient coupling of terahertz waves into and out of plasmons in the RTD-gated HEMT channel, i.e., the gain medium, via the grating-gate itself, part of the active device, rather than by an external antenna structure as discussed in previous works, therefore potentially enabling terahertz amplification with associated power gains >40 dB.

Scopus* WEB OF SCIENCE*

Large electronic conductivity in complex oxide heterostructures with ultra high electron density (Completo, 2016)

AREZOOMANDAN, S., CONDORI, H., CHANANA, A., XU, P., NAHATA, A., JALAN, B., SENSALE RODRIGUEZ, B.

APL Materials, v.: 4 2016

Palabras clave: conductivity complex oxides 2DEG

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electronica

Medio de divulgación: Internet

ISSN: 2166532X

<http://scitation.aip.org/content/aip/journal/aplmater/4/7/10.1063/1.4959284>

We study the two-dimensional electron gas at the interface of NdTiO₃ and SrTiO₃ to reveal its nanoscale transport properties. At electron densities approaching 10¹⁵ cm⁻², our terahertz spectroscopy data show conductivity levels that are up to six times larger than those extracted from DC electrical measurements. Moreover, the largest conductivity enhancements are observed in samples intentionally grown with larger defect densities. This is a signature of electron transport over the characteristic length-scales typically probed by electrical measurements being significantly affected by scattering by structural defects introduced during growth, and, a trait of a much larger electron mobility at the nanoscale.

Scopus* WEB OF SCIENCE*

Exceptional Terahertz Wave Modulation in Graphene Enhanced by Frequency Selective Surfaces (Completo, 2016)

YAN, R., AREZOOMANDAN, S., SENSALE RODRIGUEZ, B., XING, H. G.

ACS Photonics, v.: 3 3, p.:315 - 323, 2016

Palabras clave: graphene modulation terahertz

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electromagnetismo

Medio de divulgación: Internet

ISSN: 23304022

<http://pubs.acs.org/doi/abs/10.1021/acsp Photonics.5b00639>

In this paper we theoretically and experimentally analyze the design trade-offs in terahertz metamaterial modulators consisting of hybrid graphene/metal stacked structures. In these devices graphene is used as the active medium, whereas a passive metallic frequency selective surface is employed to enhance the light-matter interaction in graphene. When altering the key geometrical structural parameters, we observe a close match between our experiments and theory, showing that it is possible to achieve an optimal trade-off between modulation depth, insertion loss, and speed in these devices. Moreover, a transmission line based compact mathematical model is introduced in order to explain our experimental observations and predict the performance limits in these structures.

Scopus® WEB OF SCIENCE™

Resonant Tunneling Assisted Propagation and Amplification of Plasmons in HEMTs (Completo, 2016)

BHARDWAJ, S., SENSAL RODRIGUEZ, B., XING, H. G., RAJAN, S., VOLAKIS, J.

Journal of Applied Physics, v.: 119 2016

Palabras clave: HEMT plasmonics terahertz

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electromagnetismo

Medio de divulgación: Internet

ISSN: 00218979

<http://scitation.aip.org/content/aip/journal/jap/119/1/10.1063/1.4939076>

A rigorous theoretical and computational model is developed for the plasma-wave propagation in high electron mobility transistor structures with electron injection from a resonant tunneling diode at the gate. We discuss the conditions in which low-loss and sustainable plasmon modes can be supported in such structures. The developed analytical model is used to derive the dispersion relation for these plasmon-modes. A non-linear full-wave-hydrodynamic numerical solver is also developed using a finite difference time domain algorithm. The developed analytical solutions are validated via the numerical solution. We also verify previous observations that were based on a simplified transmission line model. It is shown that at high levels of negative differential conductance, plasmon amplification is indeed possible. The proposed rigorous models can enable accurate design and optimization of practical resonant tunnel diode-based plasma-wave devices for terahertz sources, mixers, and detectors, by allowing a precise representation of their coupling when integrated with other electromagnetic structures.

Scopus® WEB OF SCIENCE™

Geometrical tradeoffs in graphene-based deeply-scaled electrically reconfigurable metasurfaces (Completo, 2015)

AREZOOMANDAN, S., SENSAL RODRIGUEZ, B.

Scientific Reports, v.: 5 2015

Palabras clave: terahertz metamaterials

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electromagnetismo

Medio de divulgación: Internet

ISSN: 20452322

<http://www.nature.com/srep/2015/150306/srep08834/full/srep08834.html>

In this work we study the terahertz light propagation through deeply-scaled graphene-based reconfigurable metasurfaces, i.e. metasurfaces with unit-cell dimensions much smaller than the terahertz wavelength. These metasurfaces are analyzed as phase modulators for constructing reconfigurable phase gradients along an optical interface for the purpose of beam shaping. Two types of deeply-scaled metacell geometries are analyzed and compared, which consist of: (i) multi split ring resonators, and (ii) multi spiral resonators. Two figures of merit, related to: (a) the loss and (b) the degree of reconfigurability achievable by such metamaterials -when applied in beam shaping applications-, are introduced and discussed. Simulations of these two types of deep-subwavelength geometries, when changing the metal coverage-fraction, show that there is an optimal coverage-fraction that gives the best tradeoff in terms of loss versus degree of reconfigurability. For both types of geometries the best tradeoff occurs when the area covered by the metallic region is around 40% of the metacell total area. From this point of view, reconfigurable deeply-scaled

metamaterials can indeed provide a superior performance for beam shaping applications when compared to not deeply-scaled ones; however, counterintuitively, employing very highly-packed structures might not be beneficial for such applications.

Scopus' WEB OF SCIENCE™

Graphene Based Optoelectronics (Completo, 2015)

SENSALE RODRIGUEZ, B.

Journal of Lightwave Technology, v.: 33 5 , p.:1100 - 1108, 2015

Palabras clave: graphene

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 07338724

<http://dx.doi.org/10.1109/JLT.2014.2373173>

Owed to its extraordinary electronic, thermal, and optical properties, as well as its integration possibilities and low cost, graphene has emerged as an attractive material for a myriad of optoelectronic applications. Although just one atom-thick, single-layer graphene is capable of efficiently interacting with optical waves over a wide spectral range extending from terahertz to visible frequencies. Moreover, its intrinsic nature enables the integration of graphene with silicon-based photonic devices in CMOS compatible processes. This paper reviews and discusses recent progress on graphene-based optoelectronic devices for modulating, detecting, generating, and beam-shaping optical waves in a broad range of wavelengths extending from ~500 nm to ~500 μm .

Scopus' WEB OF SCIENCE™

Effect of the intra-layer potential distributions and spatial currents on the performance of graphene SymFETs (Completo, 2015)

SENSALE RODRIGUEZ, B. , HASAN, M.

AIP Advances, v.: 5 2015

Palabras clave: graphene FET model

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electronica

Medio de divulgación: Internet

ISSN: 21583226

<http://scitation.aip.org/content/aip/journal/adva/5/9/10.1063/1.4930200>

In this paper, a two-dimensional (2-D) model for a graphene symmetric field effect transistor (SymFET), which considers (a) the intra-graphene layer potential distributions and (b) the internal current flows through the device, is presented and discussed. The local voltages along the graphene electrodes as well as the current-voltage characteristics of the device are numerically calculated based on a single-particle tunneling model. Our numerical results show that: (i) when the tunneling current is small, due to either a large tunneling thickness (≥ 2 atomic layers of BN) or a small coherence length, the voltage distributions along the graphene electrodes have almost zero variations upon including these distributed effects, (ii) when the tunnel current is large, due to either a small tunneling thickness (~ 1 atomic layer of BN) or due to a large coherence length, the local voltage distributions along the graphene electrodes become appreciable and the device behavior deviates from that predicted by a 1-D approximation. These effects, which are not captured in one-dimensional SymFET models, can provide a better understanding about the electron dynamics in the device and might indicate potential novel applications for this proposed device.

Scopus' WEB OF SCIENCE™

TFET based circuit design using the transconductance generation efficiency gm/Id method (Completo, 2015)

BARBONI, L. , SINISCALCHI, M. , SENSAL RODRIGUEZ, B.

IEEE Journal of the Electron Devices Society, v.: 3 2015

Palabras clave: TFET

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Electronica

ISSN: 21686734

<http://dx.doi.org/10.1109/JEDS.2015.2412118>

Tunnel field effect transistors (TFETs) have emerged as one of the most promising post-CMOS transistor technologies. In this paper, we: 1) review the perspectives of such devices for low-power

high-frequency analog integrated circuit applications (e.g., GHz operation with sub-0.1 mW power consumption); 2) discuss and employ a compact TFET device model in the context of the gm/Id integrated analog circuit design methodology; and 3) compare several proposed TFET technologies for such applications. The advantages of TFETs arise since these devices can operate in the sub-threshold region with larger transconductance-to-current ratio than traditional FETs, which is due to the current turn-on mechanism being interband tunneling rather than thermionic emission. Starting from technology computer-aided design and/or analytical models for Si-FinFETs, graphene nano-ribbon (GNR) TFETs and InAs/GaSb TFETs at the 15-nm gate-length node, as well as InAs double-gate TFETs at the 20-nm gate-length node, we conclude that GNR TFETs might promise larger bandwidths at low-voltage drives due to their high current densities in the sub-threshold region. Based on this analysis and on theoretically predicted properties, GNR TFETs are identified as one of the most attractive field effect transistor technologies proposed-to-date for ultra-low power analog applications.

Scopus*

Graphene-based electrically reconfigurable deep-subwavelength metamaterials for active control of THz light propagation (Completo, 2014)

AREZOOMANDAN, S. , YANG, K. , SENSALE RODRIGUEZ, B.

Applied Physics A: Materials Science and Processing (E), v.: 117 2014

Palabras clave: graphene

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 14320630

<http://link.springer.com/article/10.1007/s00339-014-8693-8>

This work studies the terahertz light propagation through graphene-based reconfigurable metasurfaces where the unit cell dimensions are much smaller than the terahertz wavelength. The proposed devices, which poses deep-subwavelength unit cell and active region dimensions can operate as amplitude and/or phase modulators in certain specific frequency bands determined by the device geometry. Reconfigurability is attained via electrostatically tuning the optical conductivity of patterned graphene layers, which are strategically located in each unit cell. The ultra-small unit cell dimensions can be advantageous for beam shaping applications.

Graphene-based tunable metamaterial terahertz filters (Completo, 2014)

YANG, K. , AREZOOMANDAN, S. , LIU, S. , NAHATA, A. , SENSALE RODRIGUEZ, B.

Applied Physics Letters, v.: 105 2014

Palabras clave: metamaterials

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 00036951

<http://dx.doi.org/10.1063/1.4894807>

We propose and describe a micro-machined tunable metamaterial terahertz filter based on graphene. The device structure consists of periodic metallic rings with several gaps where tunable graphene stripes are located. We demonstrate that the filter resonance frequency can be adjusted easily by varying the conductivity of graphene and implement this by changing the number of stacked graphene layers. Moreover, the proposed design is scalable, in the sense that the resonance frequency tuning can be controlled by scaling the inner and outer radius of the metal rings. Using numerical simulations and terahertz time-domain spectroscopy measurements of the fabricated samples, we show that the resonance frequency of the structure can be altered by 40% (i.e., from ~ 0.2 THz to ~ 0.12 THz) by simply tuning the conductivity of graphene. Importantly, the active area of the device is $\ll 0.1\%$ of the total unit cell area, which can boost the device speed upon electrostatic actuation.

Scopus* WEB OF SCIENCE*

Effect of fringing capacitance on RF performance of gate-recessed E-mode InAlN HEMTs (Completo, 2014)

SONG, B. , SENSALE RODRIGUEZ, B. , WANG, R. , GUO, J. , HU, Z. , YUE, Y. , FARIA, F. ,

KETTERSON, A. , SCHUETTE, M. , BEAM, E. , SAUNIER, P. , GAO, X. , GUO, S. , FAY P. , JENA, D. , H. G. XING

IEEE Transactions on Electron Devices, v.: 61 2014

Palabras clave: HEMT

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 00189383

<http://dx.doi.org/10.1109/TED.2014.2299810>

The effects of fringing capacitances on the high-frequency performance of T-gate GaN high-electron mobility transistors (HEMTs) are investigated. Delay time components have been analyzed for gate-recessed InAlN/GaN HEMTs with a total gate length of 40 nm and fT/f_{max} of 225/250 GHz. It is found that the gate extrinsic capacitance contributes significantly to the parasitic delay—approximately 50% of the total delay in these highly scaled devices. The gate extrinsic capacitance comprises two components: 1) parallel plate capacitances between the T-gate and the surrounding electrodes and 2) the fringing capacitance between the gate stem and the access regions. Detailed study of the gate electrostatics reveals that the later, the fringing capacitance between the T-gate stem and the device access region, ultimately determines the lower limit of the extrinsic capacitance C_{ext} ; this minimum C_{ext} can be realized experimentally using a large gate stem height and employing low- k passivation dielectric. Since the corresponding parasitic delay can be expressed as $C_{ext}/g_{m,int}$, this paper also highlights the importance of maximizing $g_{m,int}$ in ultrascaled HEMTs by adopting strategies to enhance carrier velocity.

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Direct Electrical Observation of Plasma Waves in GaN-Based 2DEGs (Completo, 2014)

ZHAO, Y., CHEN, W., LI, W., ZHU, M., YUE, Z., SONG, B., ENCOMENDERO, J., SENSALE RODRIGUEZ, B., H. G. XING, FAY, P.

Applied Physics Letters, v.: 105 2014

Palabras clave: HEMT plasmonics

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 00036951

<http://dx.doi.org/10.1063/1.4900964>

In this work, signatures of plasma waves in GaN-based high electron mobility transistors were observed by direct electrical measurement at room temperature. Periodic grating-gate device structures were fabricated and characterized by on-wafer G-band (140220 GHz) s-parameter measurements as a function of gate bias voltage and device geometry. A physics-based equivalent circuit model was used to assist in interpreting the measured s-parameters. The kinetic inductance extracted from the measurement data matches well with theoretical predictions, consistent with direct observation of plasma wave-related effects in GaN-channel devices at room temperature. This observation of electrically significant room-temperature plasma-wave effects in GaN-channel devices may have implications for future millimeter-wave and THz device concepts and designs.

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The linear and nonlinear THz properties of graphene (Completo, 2013)

YANG, K., AREZOMANDAN, S., SENSALE RODRIGUEZ, B.

Terahertz Science & Technology, 2013

Palabras clave: graphene terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 19417411

<http://www.tstnetwork.org/10.11906/TST.223-233.2013.12.16>

Graphene has recently been the subject of much attraction for THz applications due to its extraordinary material properties arising from its particular band structure. This paper reviews and discusses the linear and nonlinear properties of graphene at microwave/THz frequencies, and it also compares these properties with those of other semiconducting materials. By taking into account the effect of electron momentum relaxation time on intra-band optical transitions, which is significant at microwave and terahertz frequencies, we derive an analytical form for the third order microwave/THz susceptibility in graphene which is found to be $> 10^3$ times larger than that of other typical nonlinear materials. Finally, current and future applications of such properties in THz devices are discussed, in particular, and we discuss a novel application of graphene into active THz filters.

Terahertz imaging employing graphene modulator arrays (Completo, 2013)

SENSALE RODRIGUEZ, B. , RAFIQUE, S. , YAN, R. , PROTASENKO, V. , JENA, D. , LIU L. , XING H.G.
Optics Express, v.: 21 2 , p.:2324 - 2330, 2013

Palabras clave: graphene

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 10944087

Scopus' WEB OF SCIENCE"

Time Delay Analysis in High Speed Gate-recessed E-mode InAlN HEMTs (Completo, 2013)

SENSALE RODRIGUEZ, B. , GUO, J. , WANG, R. , FAY P. , JENA, D. , XING H.G.

Solid-State Electronics, v.: 80 p.:67 - 71, 2013

Palabras clave: HEMT

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 00381101

Scopus' WEB OF SCIENCE"

Power Amplification at THz via Plasma Wave Excitation in RTD-gated HEMTs (Completo, 2013)

SENSALE RODRIGUEZ, B. , LIU L. , FAY P. , JENA, D. , XING H.G.

IEEE Transactions on Terahertz Science and Technology , v.: 3 2 , p.:200 - 206, 2013

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 2156342X

Scopus' WEB OF SCIENCE"

Graphene for Reconfigurable THz Optoelectronics (Completo, 2013)

SENSALE RODRIGUEZ, B. , YAN, R. , LIU L. , JENA, D. , XING H.G.

Proceedings of the IEEE, v.: 101 7 , p.:1705 - 1716, 2013

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 00189219

Scopus' WEB OF SCIENCE"

Graphene-insulator-graphene active plasmonic terahertz devices (Completo, 2013)

SENSALE RODRIGUEZ, B.

Applied Physics Letters, v.: 103 p.:123109 2013

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 00036951

Scopus' WEB OF SCIENCE"

Ultra scaled InAlN/GaN HEMTs with fT of 400 GHz (Completo, 2013)

YUE Y. , WANG, R. , SENSAL RODRIGUEZ, B. , GUO, J. , SONG, B. , LI, G. , SNIDER, G. , FAY P. ,

JENA, D. , XING H.G.

Japanese Journal of Applied Physics, v.: 52 8 , p.:8 2013

Palabras clave: HEMT

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

ISSN: 00214922

Scopus' WEB OF SCIENCE"

Broadband graphene terahertz modulators enabled by intraband transitions (Completo,

2012) Trabajo relevante

SENSALE RODRIGUEZ, B., YAN, R., KELLY, M., FANG, T., TAHY, K., HWANG, WS., JENA, D., LIU L., XING H.G.

Nature Communications, v.: 3 p.:780 2012

Palabras clave: grafeno

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

Lugar de publicación: UK

ISSN: 20411723

DOI: [10.1038/ncomms1787](https://doi.org/10.1038/ncomms1787)

<http://www.nature.com/ncomms/journal/v3/n4/abs/ncomms1787.html>

Terahertz technology promises myriad applications including imaging, spectroscopy and communications. However, one major bottleneck at present for advancing this field is the lack of efficient devices to manipulate the terahertz electromagnetic waves. Here we demonstrate that exceptionally efficient broadband modulation of terahertz waves at room temperature can be realized using graphene with extremely low intrinsic signal attenuation. We experimentally achieved more than 2.5 times superior modulation than prior broadband intensity modulators, which is also the first demonstrated graphene-based device enabled solely by intraband transitions. The unique advantages of graphene in comparison to conventional semiconductors are the ease of integration and the extraordinary transport properties of holes, which are as good as those of electrons owing to the symmetric conical band structure of graphene. Given recent progress in graphene-based terahertz emitters and detectors, graphene may offer some interesting solutions for terahertz technologies.

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Extraordinary Control of Terahertz Beam Reflectance in Graphene Electro-absorption Modulators (Completo, 2012)

SENSALE RODRIGUEZ, B., YAN, R., RAFIQUE, S., ZHU, M., PROTASENKO, V., KELLY, M., JENA, D., LIU L., XING H.G.

Nano letters (Print), v.: 12 9, p.:4518 - 4522, 2012

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Ciencias Naturales y Exactas / Ciencias Físicas / Física de los Materiales Condensados /

Medio de divulgación: Papel

ISSN: 15306984

We demonstrate a graphene-based electro-absorption modulator achieving extraordinary control of terahertz reflectance. By concentrating the electric field intensity in an active layer of graphene, an extraordinary modulation depth of 64% is achieved while simultaneously exhibiting low insertion loss (2 dB), which is remarkable since the active region of the device is atomically thin. This modulator performance, among the best reported to date, indicates the enormous potential of graphene for terahertz reconfigurable optoelectronic devices.

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InAlN/AlN/GaN HEMTs with Regrown Ohmics and fT of 370 GHz (Completo, 2012)

YUE Y., HU, Z., GUO, J., SENSAL RODRIGUEZ, B., LI, G., WANG, R., FARIA, F., FANG, T., SNIDER, G., FAY P., JENA, D., XING H.G.

IEEE Electron Device Letters, v.: 33 7, p.:988 - 990, 2012

Palabras clave: HEMT

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

Lugar de publicación: USA

ISSN: 07413106

We report 30-nm-gate-length InAlN/AlN/GaN/SiC high-electron-mobility transistors (HEMTs) with a record current gain cutoff frequency (fT) of 370 GHz. The HEMT without back barrier exhibits an extrinsic transconductance (gm,ext) of 650 mS/mm and an on/off current ratio of 106 owing to the incorporation of dielectric-free passivation and regrown ohmic contacts with a contact resistance of 0.16 Ω·mm. Delay analysis suggests that the high fT is a result of low gate-drain parasitics associated with the rectangular gate. Although it appears possible to reach 500-

GHz fT by further reducing the gate length, it is imperative to investigate alternative structures that offer higher mobility/velocity while keeping the best possible electrostatic control in ultrascaled geometry.

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Efficient terahertz electro-absorption modulation employing graphene plasmonic structures (Completo, 2012)

SENSALE RODRIGUEZ, B. , YAN, R. , ZHU, M. , JENA, D. , LIU L. , XING H.G.

Applied Physics Letters, v.: 101 p.:261115 2012

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Papel

ISSN: 00036951

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Enhanced Terahertz Detection in Resonant Tunnel Diode-Gated HEMTs (Completo, 2012)

SENSALE RODRIGUEZ, B. , FAY P. , JENA, D. , LIU L. , XING H.G.

ECS Transactions, v.: 49 1 , p.:93 - 102, 2012

Palabras clave: HEMT THz RTD

Areas de conocimiento:

Ingeniería y Tecnología / Nanotecnología / Nano-materiales /

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Ciencias Naturales y Exactas / Ciencias Físicas / Física de los Materiales Condensados /

Medio de divulgación: Papel

ISSN: 19385862

We report our studies on terahertz detection in high electron mobility transistors (HEMTs) with a resonant-tunneling gate structure, which exhibit negative differential conductance (NDC) from gate to channel. We name these devices as resonant-tunnel-diode (RTD) gated HEMTs. The effect of NDC on detector responsivity is theoretically derived based on Dyakonov-Shur electron-plasma wave theory. The positive gate conductance in traditional HEMTs damps the electron plasma waves, therefore reducing responsivity; conversely, in devices employing NDC gates, detector sensitivity can be greatly enhanced. Our analysis also demonstrates that resonant detection, thus high responsivity, can be obtained even near the threshold voltage in RTD-gated HEMTs, while only non-resonant detection is attainable in conventional HEMTs in this bias regime. Numerical exploration of the design space for GaN HEMTs with double-barrier AlGaIn/GaN/AlGaIn RTD gates is performed, showing that thin barriers with low Al composition may be the most practical structures to demonstrate this enhanced detection mechanism.

A New Class of Tunable Metamaterial Terahertz Modulators (Completo, 2012)

SENSALE RODRIGUEZ, B. , YAN, R. , JENA, D. , XING H.G. , LIU L.

Optics Express, v.: 20 27 , p.:28664 - 28671, 2012

Palabras clave: THz modulator metamaterial

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

ISSN: 10944087

Scopus[®] WEB OF SCIENCE[™]

220 GHz Quaternary Barrier InAlGaIn/GaN HEMTs (Completo, 2011)

WANG, R. , LI, G. , VERMA, J. , SENSAL RODRIGUEZ, B. , FANG, T. , GUO, J. , SNIDER, G. , FAY P. , JENA, D. , XING H.G.

IEEE Electron Device Letters, v.: 32 9 , p.:1215 - 1217, 2011

Palabras clave: HEMT

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Papel

Lugar de publicación: USA

ISSN: 07413106

Depletion-mode high-electron mobility transistors (HEMTs) based on a quaternary barrier $\text{In}_{0.13}\text{Al}_{0.83}\text{Ga}_{0.04}\text{N}/\text{AlN}/\text{GaN}$ heterostructure on SiC substrate were fabricated. The 66-nm-long gate device shows a dc drain current density of 2.1 A/mm, a peak extrinsic transconductance of 548 mS/mm, and a record current gain cutoff frequency f_T of 220 GHz for quaternary barrier GaN-based HEMTs, which is also among the highest f_T for all GaN-based HEMTs. The large $L_g \cdot f_T$ product of 14.5 GHz $\cdot \mu\text{m}$ with a gate-length-to-barrier-thickness aspect ratio of 5.8 indicates a high effective electron velocity of 0.9×10^7 cm/s, attributed to a high electron Hall mobility (1790 $\text{cm}^2/\text{V} \cdot \text{s}$ at an ns of 1.8×10^{13})—the highest reported in GaN-channel HEMTs with In-containing barriers. An intrinsic electron velocity of 1.7×10^7 cm/s, extracted from conventional Moll delay-time analysis, is comparable to that reported in the state-of-art AlGaIn/GaN HEMTs.

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FET THz detectors in the quantum capacitance limited region (Completo, 2011)

SENSALE RODRIGUEZ, B., LIU L., WANG, R., ZIMMERMANN T., FAY P., JENA, D., XING H.G.
International Journal of High Speed Electronics and Systems (print), v.: 20 3, p.:597 - 609, 2011
Palabras clave: THz detection quantum capacitance plasma waves field effect transistors

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Papel

Lugar de publicación: Singapore

ISSN: 01291564

DOI: [10.1142/S0129156411006891](https://doi.org/10.1142/S0129156411006891)

<http://www.worldscinet.com/ijhses/20/2003/S0129156411006891.html>

In this paper, we report our studies on field effect transistor (FET) THz detectors operating in the non-resonant mode based on the Dyakonov-Shur plasma wave detection theory, where the quantum capacitance dominates. The influence of quantum capacitance in detector response is theoretically developed and numerically simulated at low and high frequencies. Fundamental constraints in the upper frequency limit are also analyzed for FET THz detectors based on various materials, showing advantages of GaN for 8 - 20 THz applications. Experiments at microwave and THz frequencies have been carried out for GaN based devices showing agreement with the theory.

Scopus®

Unique prospects of graphene terahertz modulators (Completo, 2011)

SENSALE RODRIGUEZ, B., FANG, T., YAN, R., JENA, D., LIU L., XING H.G.

Applied Physics Letters, v.: 11 p.:113104 2011

Palabras clave: THz graphene modulator

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Papel

Lugar de publicación: USA

ISSN: 00036951

DOI: [10.1063/1.3636435](https://doi.org/10.1063/1.3636435)

http://apl.aip.org/resource/1/applab/v99/i11/p113104_s1

The modulation depth of two-dimensional electron-gas (2DEG) based terahertz (THz) modulators using AlGaAs/GaAs hetero-structures with metal gates is inherently limited to <30%. The metal gate not only attenuates the THz signal but also severely degrades modulation depth. Metal losses can be significantly reduced employing an alternative material with tunable conductivity. Graphene presents a unique solution to this problem due to its symmetric band structure and extraordinarily high hole mobility. In this work, we show that it is possible to achieve a modulation depth of >90% while simultaneously minimizing signal attenuation to <5% by tuning the Fermi level at its Dirac point. Este fue uno de los papers mas leidos de esta revista en el trimestre setiembre/noviembre de 2011 (http://apl.aip.org/features/most_downloaded?month=9&year=2011). Destaque de este artículo: News "Materials make methods" ChemPhysChem ; Volume 12, Issue 14, page 2517, October 4, 2011. Physics news highlights (AIP) : <http://www.aip.org/aip/research/PNH-9-12-2011.html> trabajo seleccionado para su difusión por el Virtual Journal of Nanoscale Science and Technology, (APS y AIP publishers), 24 issue 13 (2011), <http://www.virtualjournals.org/vjs/>

Scopus® WEB OF SCIENCE™

Trefftz Collocation Method Analysis of Microstrip Antennas (Completo, 2009)

SENSALE RODRIGUEZ, B., SENSALÉ COZZANO, B.

COMPEL-The International Journal For Computation and Mathematics in Electrical and Electronic

Engine, v.: 28 2 , p.:396 - 411, 2009

Palabras clave: Trefftz method Microstrip antennas Resonance frequencies Electric Fields

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Métodos Numéricos - Electromagnetismo Computacional

Medio de divulgación: Papel

Lugar de publicación: Bingley, UK

ISSN: 03321649

DOI: [10.1108/03321640910929290](https://doi.org/10.1108/03321640910929290)

<http://info.emeraldinsight.com/products/journals/journals.htm?id=compel>

Purpose The purpose of this paper is to introduce a fast and simple method to calculate an estimation of parameters of interest of microstrip antennas, such as the resonance frequencies for example. **Design/methodology/approach** The Trefftz collocation method will be used to solve the governing differential equations of the problem. This method uses trial functions that satisfy, in a certain region the governing differential equations. Complete sets of solutions of such equations are required so that completeness and convergence can be guaranteed. The values of the wavenumbers for which the solution of the governing equation is unbounded, are those correspondent to the resonance frequencies of the antenna. After finding the wavenumbers, with the help of empirical correction formulas (because of the effect of the fringing field), the actual resonance frequencies are determined. **Findings** The Trefftz collocation method was found to be a very simple, fast and accurate method for the computation of the electric field under the patch of a microstrip antenna. Results obtained from this method showed excellent accuracy with less computational effort than other methods previously used. **Research limitations/implications** Although the resonance wavenumbers may be accurate for any shape of antenna (because of the method convergence), the resonance frequencies might not be so accurate for irregular shapes since the parameters of the empirical formulas are approximated. Also the resonant cavity model is only valid for antennas made of thin substrates. **Originality/value** This formulation of the Trefftz method was for the first time applied to this problem, showing promising results.

Scopus' WEB OF SCIENCE™

Determination of the TE and TM modes in arbitrarily shaped waveguides using a hypersingular boundary element formulation (Completo, 2008) Trabajo relevante

SENSALE RODRIGUEZ, B. , SENSALÉ COZZANO, B. , LEITAO, V.

Aeü International Journal of Electronics and Communications, v.: 62 p.:576 - 581, 2008

Palabras clave: Waveguides Singularities Eigenvalues Hypersingular boundary element method

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Métodos Numéricos - Electromagnetismo Computacional

Medio de divulgación: Papel

Lugar de publicación: Munich, Alemania

ISSN: 14348411

<http://www.sciencedirect.com/science/journal/14348411>

In this paper a procedure based on the hypersingular element method is applied to find the TE and TM modes in arbitrarily shaped waveguides. To show the accuracy of this method, various examples are solved and the results are compared to those analytical, when there is an analytical solution, and those presented in the literature. The proposed method did not present spurious modes, and in all the examples presented showed excellent results considering a reasonable number of elements in the boundary.

Scopus' WEB OF SCIENCE™

Microstrip Antenna Analysis Using the Method of Fundamental Solutions (Completo, 2008) Trabajo relevante

SENSALE RODRIGUEZ, B. , SENSALÉ COZZANO, B. , LEITAO, V. , PEIXEIRO, C.

International journal of numerical modelling, v.: 21 6 , p.:563 - 581, 2008

Palabras clave: microstrip antennas method of fundamental solutions cavity model rectangular patch circular patch triangular patch

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica / Métodos Numéricos - Electromagnetismo Computacional

Medio de divulgación: Papel

Lugar de publicación: New York, USA

ISSN: 08943370

DOI: [10.1002/jnm.692](https://doi.org/10.1002/jnm.692)

<http://www3.interscience.wiley.com/journal/4673/home>

The method of fundamental solutions (MFS) is proposed for the analysis of microstrip patch antennas of arbitrary shape. The MFS consists mainly in approximating the solution of a problem by a linear combination of known fundamental solutions associated with source points located outside the domain. The implementation of the MFS is simple and computationally efficient. Simulation results are obtained for rectangular, circular and triangular microstrip patch antennas. The resonance frequency and input impedance results are in good agreement with those published in the literature. Two prototypes have been fabricated and tested. Good agreement has been obtained between the MFS simulations and the experimental results.

Scopus® WEB OF SCIENCE™

The Trefftz Boundary Method in Viscoelasticity (Completo, 2007) Trabajo relevante

SENSALE COZZANO, B., SENSAL RODRIGUEZ, B.

CMES: Computer Modeling in Engineering & Sciences, v.: 20 1, p.:21 - 33, 2007

Palabras clave: Trefftz method Viscoelasticity Particular Solution Method

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional

Medio de divulgación: Papel

Lugar de publicación: Norcross, GA, USA

ISSN: 15261492

DOI: [10.3970/cm.es.2007.020.021](https://doi.org/10.3970/cm.es.2007.020.021)

<http://www.techscience.com/cm.es/index.html>

In this paper, the Trefftz method is applied to solve linear viscoelasticity problems in the time domain, using Trefftz elastic series and considering the viscoelastic components in each time domain as fictitious body forces. The direct application of the Trefftz method to elastic problems is typically constrained to those cases in which the Navier equation is homogeneous. In the presence of body forces, the method of the particular solution or the method of the generalized particular solution should be used, depending on whether the body forces are constant or not inside the considered domain. Many viscoelasticity problems with or without aging can be solved by applying the elastic Trefftz series. To show the accuracy of the proposed formulation, some examples are solved and the results compared with those available in the literature.

Scopus® WEB OF SCIENCE™

PUBLICACIÓN DE TRABAJOS PRESENTADOS EN EVENTOS

Three-Independent-Gate Transistors: Opportunities in Digital, Analog and RF Applications (2016)

Completo

GAILLARDON, P.-E., SENSAL RODRIGUEZ, B.

Evento: Regional

Descripción: IEEE Latin-American Test Symposium (LATS)

Ciudad: Foz de Iguazu, Brazil

Año del evento: 2016

Palabras clave: FinFET

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Terahertz conductivity of ultra-high electron concentration 2DEGs in NTO/STO heterostructures (2016)

Completo

AREZOOMANDAN, S., SENSAL RODRIGUEZ, B.

Evento: Internacional

Descripción: SPIE Optics + Photonics

Ciudad: San Diego, CA

Año del evento: 2016

Palabras clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

Simulation of Power Gain at THz Frequencies Employing Grating-gate RTD-gated HEMTs (2016)

Resumen expandido
SENSALE RODRIGUEZ, B. , CONDORI, H.

Evento: Internacional
Descripción: Lester Eastman Biennial Conference on High Performance Devices
Ciudad: Bethlehem, PA.
Año del evento: 2016
Palabras clave: terahertz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

A Continuous Compact DC Model for Dual-Independent-Gate FinFETs (2016)

Completo
SENSALE RODRIGUEZ, B. , HASAN, M.

Evento: Internacional
Descripción: Device Research Conference 2016
Ciudad: Newark, DE
Año del evento: 2016
Palabras clave: terahertz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Tunable THz metamaterial and plasmonic devices based on graphene (2016)

Completo
SENSALE RODRIGUEZ, B. , AREZOOMANDAN, S.

Evento: Internacional
Descripción: CLEO 2016
Ciudad: San Jose, CA
Año del evento: 2016
Palabras clave: terahertz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Digital, Analog and RF Design Opportunities of Three-Independent-Gate Transistors (2016)

Completo
GAILLARDON, P.-E , SENSAL RODRIGUEZ, B.

Evento: Internacional
Descripción: ISCAS 2016
Ciudad: Montreal, Canada
Año del evento: 2016
Palabras clave: FinFET
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Near-field Enhancement and Optimal Performance in Metamaterial Terahertz Modulators Based on 2D-materials (2016)

Completo
AREZOOMANDAN, S. , SENSAL RODRIGUEZ, B.

Evento: Internacional
Descripción: 14th International Conference of Near-Field Optics, Nanophotonics and Related Techniques (NFO-14)
Ciudad: Hamamatsu, Japan
Año del evento: 2016
Palabras clave: metamaterials
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /
Medio de divulgación: Internet

High-Q terahertz reconfigurable metamaterials using graphene (2016)

Completo

AREZOOMANDAN, S. , SENSAL RODRIGUEZ, B.

Evento: Internacional

Descripción: SPIE Optics + Photonics

Ciudad: San Diego, CA

Año del evento: 2016

Palabras clave: metamaterials

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

Terahertz Plasmon Amplification in RTD-gated HEMTs with a Grating-gate (2016)

Completo

CONDORI, H. , SENSAL RODRIGUEZ, B.

Evento: Internacional

Descripción: SPIE Optics + Photonics

Ciudad: San Diego, CA

Año del evento: 2016

Palabras clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

Perspectives of DIG FinFETs for Efficient Terahertz Detection Applications (2016)

Completo

HASAN, M. , SENSAL RODRIGUEZ, B.

Evento: Internacional

Descripción: SPIE Optics + Photonics

Ciudad: San Diego, CA

Año del evento: 2016

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

THz Spectroscopy of NdTiO₃/SrTiO₃ Heterostructures Towards Plasmonic Applications (2015)

Resumen

SENSAL RODRIGUEZ, B. , AREZOOMANDAN, S.

Evento: Internacional

Descripción: Electronic Materials Conference (EMC)

Ciudad: Columbus, OH

Año del evento: 2015

Palabras clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Effect Of Electron Momentum Relaxation Time On The Terahertz Plasmonic Properties Of Graphene Structures (2015)

Completo

CONDORI, H. , SENSAL RODRIGUEZ, B.

Evento: Internacional

Descripción: IRMMWTHz 2015

Ciudad: Hong Kong

Año del evento: 2015

Palabras clave: terahertz

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Full-Wave Hydrodynamic Model for Predicting THz Emission from Grating-Gate RTD-Gated Plasma Wave HEMTs (2015)

Completo

BHARDWAJ, S. , SENSALE RODRIGUEZ, B. , VOLAKIS, J.

Evento: Internacional

Descripción: Device Research Conference 2015

Ciudad: Columbus, OH

Año del evento: 2015

Palabras clave: terahertz

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Two-dimensional distributed effects in graphene SymFETs (2015)

Completo

HASAN, M. , SENSALE RODRIGUEZ, B.

Evento: Internacional

Descripción: Device Research Conference 2015

Ciudad: Columbus, OH

Año del evento: 2015

Palabras clave: model

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Active control of THz light propagation through graphene-based electrically reconfigurable metasurfaces (2014)

Completo

AREZOOMANDAN, S. , SENSALE RODRIGUEZ, B.

Evento: Internacional

Descripción: META 14

Ciudad: Singapore

Año del evento: 2014

Palabras clave: metamaterials

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

A deep subwavelength metamaterial terahertz phase modulator (2014)

Completo

AREZOOMANDAN, S. , SENSALE RODRIGUEZ, B.

Evento: Internacional

Descripción: IRMMWTHz 2014

Ciudad: Tucson, AZ

Año del evento: 2014

Palabras clave: terahertz

Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Design of THz filters using a modified bisection method (2014)

Completo
YANG, K. , SENSALE RODRIGUEZ, B.

Evento: Internacional
Descripción: IRMMWTHz 2014
Ciudad: Tucson, AZ
Año del evento: 2014
Palabras clave: terahertz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Emerging Electronic Devices for THz Sensing and Imaging (2014)

Completo
FAY, P. , SENSALE RODRIGUEZ, B. , H. G. XING

Evento: Internacional
Descripción: SPIE Optics + Photonics
Ciudad: San Diego, CA
Año del evento: 2014
Palabras clave: terahertz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

THz plasmonic absorption in periodically patterned semiconductor structures (2013)

Completo
ZHANG, H. , SENSALE RODRIGUEZ, B. , LIU L. , XING H.G.

Evento: Internacional
Descripción: International Wireless Symposium (IWS)
Ciudad: Beijing, China
Año del evento: 2013
Palabras clave: THz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /
Medio de divulgación: Otros

Tunable Graphene-based Metamaterial Terahertz Modulators (2013)

Completo
YAN, R. , SENSALE RODRIGUEZ, B. , LIU L. , XING H.G.

Evento: Internacional
Descripción: CLEO
Ciudad: San Jose, CA
Año del evento: 2013
Publicación arbitrada
Palabras clave: THz
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Near-field Enhanced Graphene Terahertz Modulator (2013)

Completo
YAN, R. , LIU L. , SENSALE RODRIGUEZ, B. , XING H.G.

Evento: Internacional
Descripción: IRMMWTHz 2013
Ciudad: Mainz, Germany
Año del evento: 2013
Publicación arbitrada
Palabras clave: THz
Áreas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Noise Performance Of RTD-gated Plasma-wave HEMT THz Detectors (2013)

Completo

ENCOMENDERO, J., SENSALE RODRIGUEZ, B., XING H.G.

Evento: Internacional

Descripción: IRMMWTHz 2013

Ciudad: Mainz, Germany

Año del evento: 2013

Publicación arbitrada

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Perspectives Of Graphene SymFETs For THz Applications (2013)

Completo

SENSALE RODRIGUEZ, B., JENA, D., XING H.G.

Evento: Internacional

Descripción: IRMMWTHz 2013

Ciudad: Mainz, Germany

Año del evento: 2013

Publicación arbitrada

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Fisho: A Cost-Effective Intelligent Autonomous Robot Fish (2013)

Completo

ASTESIANO, D., CANETTI, R., ROMERO, P., SENSALE RODRIGUEZ, B.

Evento: Internacional

Descripción: IEEE International Conference on Advanced Robotics (ICAR) 2013

Ciudad: Montevideo. Uruguay

Año del evento: 2013

Publicación arbitrada

Palabras clave: Control

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Reconfigurable THz devices using graphene (2013)

Completo

SENSALE RODRIGUEZ, B., XING H.G.

Evento: Internacional

Descripción: SPIE Optics + Photonics

Ciudad: San Diego, CA

Año del evento: 2013

Publicación arbitrada

Palabras clave: THz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Monolithically Integrated E/D-mode InAlN HEMTs with $f_t/f_{max} > 200/220$ GHz (2012)

Resumen expandido

SONG, B., SENSALE RODRIGUEZ, B., GUO, J., WANG, R., FARIA, F., YUE Y., SNIDER, G., FAY P., JENA, D., XING H.G.

Evento: Internacional
Descripción: Device Reseach Conference 2012
Ciudad: State College, PA - USA
Año del evento: 2012
Anales/Proceedings:DRC technical digest
Publicación arbitrada
Editorial: IEEE
Ciudad: IEEE
Palabras clave: HEMT
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Exceptional Tunability of THz Reflectance in Graphene Structures (2012)

Completo
SENSALE RODRIGUEZ, B. , YAN, R. , ZHU, M. , RAFIQUE, S. , JENA, D. , PROTASENKO, V. , LIU L. , XING H.G.

Evento: Internacional
Descripción: IRMMWTHz 2012
Ciudad: Wollongong, Australia
Año del evento: 2012
Publicación arbitrada
Palabras clave: THz
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /
Medio de divulgación: Internet

Perspectives of TFETs for low power analog ICs (2012)

Completo
SENSALE RODRIGUEZ, B. , BARBONI, L. , FAY P. , SEABAUGH, A. , SILVEIRA, F. , XING H.G.

Evento: Internacional
Descripción: IEEE Subthreshold Microelectronics Conference
Ciudad: Boston, USA
Año del evento: 2012
Publicación arbitrada
Palabras clave: TFET
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /

Comparative Study of E- and D-mode InAlN/AlN/GaN HEMTs with FT Near 200 GHz (2011)

Resumen expandido
SENSALE RODRIGUEZ, B. , JENA, D. , SNIDER, G. , LI, G. , XING H.G. , VERMA, J. , GUO, J. , FAY P. , WANG, R.

Evento: Internacional
Descripción: International Semiconductor Device Research Symposium
Ciudad: Washington DC, USA
Año del evento: 2011
Publicación arbitrada
Editorial: IEEE
Ciudad: New York
Palabras clave: HEMT
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica /
Medio de divulgación: Internet

Frequency Domain THz Characterization of Graphene (2011)

Resumen

SENSALE RODRIGUEZ, B. , XING H.G. , YAN, R. , LIU L. , JENA, D.

Evento: Internacional

Descripción: Electronic Materials Conference

Ciudad: Santa Barbara, CA

Año del evento: 2011

Publicación arbitrada

Palabras clave: THz graphene

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Internet

FET THz Detectors Operating in the Quantum Capacitance Limited Region (2010)

Completo

SENSALE RODRIGUEZ, B. , WANG, R. , LIU L. , JENA, D. , XING H.G.

Evento: Internacional

Descripción: Lester Eastman Conference on High Performance Devices

Ciudad: Troy, NY USA

Año del evento: 2010

Publicación arbitrada

Palabras clave: THz detection quantum capacitance HEMTs

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Físicas / Física de los Fluidos y Plasma /

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica / Nanoelectronic

Medio de divulgación: Papel

Initial Studies on Microwave and Terahertz detection using AlN/GaN HEMTs (2010)

Resumen

SENSALE RODRIGUEZ, B. , LIU L. , ZHANG Z. , FAY P. , XING H.G.

Evento: Internacional

Descripción: Electronic Materials Conference

Ciudad: Notre Dame, IN USA

Año del evento: 2010

Publicación arbitrada

Palabras clave: terahertz detector

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Físicas / Física de los Fluidos y Plasma /

Medio de divulgación: Papel

Development of Microwave and THz Detectors Utilizing AlN/GaN High Electron Mobility Transistors (2010)

Completo

LIU L. , SENSAL RODRIGUEZ, B. , ZHANG Z. , XING H.G. , FAY P.

Evento: Internacional

Descripción: 21st International Symposium on Space Terahertz Technology

Ciudad: Oxfordshire, UK

Año del evento: 2010

Publicación arbitrada

Palabras clave: 2DEF THz detection

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Ciencias Naturales y Exactas / Ciencias Físicas / Física de los Fluidos y Plasma /

Medio de divulgación: Papel

Common Source LNA Design Space Exploration in All Inversion Regions (2009)

Completo

SENSALE RODRIGUEZ, B. , FIORELLI, R. , SILVEIRA, F.

Evento: Regional
Descripción: IBERCHIP Workshop 2009 (IWS2009)
Ciudad: Buenos Aires, Argentina
Año del evento: 2009
Anales/Proceedings: Proceedings IBERCHIP Workshop 2009
Publicación arbitrada
Palabras clave: LNA ACM model Design Space Exploratrion
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /
Ingeniería Eléctrica y Electrónica /
Medio de divulgación: Papel

Analysis of Microstrip Patch Antennas Using the Trefftz Mesh-Free Method (2008)

Completo
SENSALE RODRIGUEZ, B. , SENSALÉ COZZANO, B.

Evento: Internacional
Descripción: Fifth Workshop on Trefftz Methods, Trefftz.08.
Ciudad: Leuven, Belgium
Año del evento: 2008
Anales/Proceedings: Proceedings of the 2008 Leuven Symposium on Applied Mechanics in
Engineering - CD-ROM
ISSN/ISBN: 9789073802858
Publicación arbitrada
Editorial: Katholieke Universiteit Leuven
Ciudad: Heverlee, Belgium
Palabras clave: Trefftz method microstrip antennas
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /
Ingeniería Eléctrica y Electrónica /
Medio de divulgación: CD-Rom
<http://www.mech.kuleuven.be/lsame08/trefftz08.html>

MFS analysis of Microstrip Antennas (2007)

Completo
SENSALE RODRIGUEZ, B. , SENSALÉ COZZANO, B. , LEITAO, V. , PEIXEIRO, C.

Evento: Internacional
Descripción: MFS 2007
Ciudad: Ayia Napa, Cyprus
Año del evento: 2007
Publicación arbitrada
Areas de conocimiento:
Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /
Ingeniería Eléctrica y Electrónica /
Medio de divulgación: CD-Rom
<http://www.ucy.ac.cy/~mfs2007/index.htm>

Resolución de problemas gobernados por la ecuación $\Delta u = b(x,y,u)$, para un operador b lineal en u , por el método de Trefftz (2006)

Completo
SENSALÉ COZZANO, B. , SENSALÉ RODRIGUEZ, B.

Evento: Internacional
Descripción: 2006 International Congress of Numerical Methods in Engineering and Applied
Sciences
Ciudad: Isla Margarita, Venezuela
Año del evento: 2006
Anales/Proceedings: Proceedings of 2006 International Congress of Numerical Methods in
Engineering and Applied Sciences CIMENICS2006
ISSN/ISBN: 9800023151
Publicación arbitrada
Editorial: Sociedad Venezolana de Métodos Numéricos en Ingeniería
Ciudad: Caracas

Palabras clave: Método de Trefftz Métodos sin malla Ecuación de Poisson
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional
Medio de divulgación: Papel

The Trefftz Boundary Method in Viscoelasticity (2006)

Completo
SENSALE COZZANO, B. , SENSAL RODRIGUEZ, B.

Evento: Internacional
Descripción: 7th International Conference on Boundary Element Techniques
Ciudad: Paris, France
Año del evento: 2006
Publicación arbitrada
Palabras clave: Trefftz method Viscoelasticity
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional
Medio de divulgación: CD-Rom

Shape sensitivity analysis in planar elasticity using the element-free Trefftz method (2005)

Completo
SENSALE COZZANO, B. , SENSAL RODRIGUEZ, B. , HERSKOVITS, J.

Evento: Internacional
Descripción: 6th World Congress on Structural and Multidisciplinary Optimization
Ciudad: Rio de Janeiro, Brasil
Año del evento: 2005
Anales/Proceedings: CD-ROM PROCEEDINGS WCSMO06
ISSN/ISBN: 8528500705
Publicación arbitrada
Editorial: International Society for Structural and Multidisciplinary Optimization
Ciudad: Rio de Janeiro
Palabras clave: Trefftz method Shape sensitivity analysis Mesh free methods Elasticity
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional
Medio de divulgación: CD-Rom
<http://www.wcsmo6.org/index.asp>

Aplicación del método de Trefftz a viscoelasticidad (2005)

Completo
SENSALE COZZANO, B. , SENSAL RODRIGUEZ, B.

Evento: Regional
Descripción: VIII Congreso Argentino de Mecánica Computacional
Ciudad: Buenos Aires, Argentina
Año del evento: 2005
Anales/Proceedings: Mecánica Computacional
Fascículo: 3
Página inicial: 345
Página final: 362
ISSN/ISBN: 1666-6070
Publicación arbitrada
Editorial: Asociación Argentina de Mecánica Computacional
Ciudad: Buenos Aires
Palabras clave: Método de Trefftz Viscoelasticidad Métodos sin malla Método de reciprocidad dual
Áreas de conocimiento:
Ingeniería y Tecnología / Ingeniería Civil / Ingeniería Civil / Métodos Numéricos - Mecánica Computacional
Medio de divulgación: CD-Rom
<http://www.cimec.org.ar/ojs/index.php/mc/issue/view/18/showToc>

Producción técnica

PRODUCTOS

Terahertz wave amplitude modulators (2011)

Prototipo, Aparato

SENSALE RODRIGUEZ, B. , XING H.G. , LIU L. , JENA, D. , YAN, R. , FANG, T.

País: Estados Unidos

Disponibilidad: Restricta

Patente o Registro:

Patente de invención

13/529,934, Terahertz wave amplitude modulators

Depósito: 20/09/2011; Examen: ; Concesión:

Patente nacional: NO

Palabras clave: THz modulation communication systems

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica /

Medio de divulgación: Otros

Evaluaciones

EVALUACIÓN DE PROYECTOS

COMITÉ EVALUACIÓN DE PROYECTOS

German Research Foundation (2017 / 2018)

Sector Extranjero/Internacional/Otros / Deutsche Forschung Gemeinschaft , Alemania

Cantidad: Mas de 20

Foundation for Polish Science (2016 / 2017)

Sector Extranjero/Internacional/Otros / European Commission, within the 7th Framework Programme for Research and Technology Development (FP7) , Polonia

Cantidad: Mas de 20

Department of Energy (2016 / 2017)

Sector Extranjero/Internacional/Otros / Department of Energy , Estados Unidos

Cantidad: Mas de 20

ECCS (2014 / 2019)

Sector Extranjero/Internacional/Otros / National Science Foundation , Estados Unidos

Cantidad: Mas de 20

EVALUACIÓN INDEPENDIENTE DE PROYECTOS

ECCS (2014 / 2019)

Estados Unidos

Cantidad: Mas de 20

EVALUACIÓN DE PUBLICACIONES

COMITÉ EDITORIAL

Nano Communication Networks (2015 / 2019)

Tipo de publicación: Revista

Editorial: Elsevier
Cantidad: De 5 a 20

Scientific Reports (2014 / 2019)

Tipo de publicación: Revista
Editorial: Nature Publishing Group
Cantidad: Mas de 20

EVALUACIÓN DE EVENTOS Y CONGRESOS

LAOP (2016)

Comité programa congreso
Colombia
Arbitrado

OSA

ACM Nanocom (2015 / 2016)

Comité programa congreso
Estados Unidos
Arbitrado

ACM

Electronic Materials Conference (2014 / 2016)

Comité programa congreso
Estados Unidos
Arbitrado

MRS

JURADO DE TESIS

Ingenieria Electrica (2014 / 2016)

Jurado de mesa de evaluación de tesis
Sector Extranjero/Internacional/Otros / University of Utah , Estados Unidos

Ciencia de los Materiales (2014 / 2016)

Jurado de mesa de evaluación de tesis
Sector Extranjero/Internacional/Otros / University of Utah , Estados Unidos

Fisica (2014 / 2016)

Jurado de mesa de evaluación de tesis
Sector Extranjero/Internacional/Otros / University of Utah , Estados Unidos

Ingenieria Electrica (2014 / 2016)

Jurado de mesa de evaluación de tesis
Sector Extranjero/Internacional/Otros / University of Utah , Estados Unidos

Formación de RRHH

TUTORÍAS CONCLUIDAS

POSGRADO

Emerging field effect transistors for THz detection (2018)

Tesis de doctorado
Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos
Tipo de orientación: Tutor único o principal
Nombre del orientado: Mehdi Hasan
País/Idioma: Estados Unidos, Inglés

Palabras Clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

Terahertz characterization of III-Nitride compound semiconductors and novel device structures (2018)

Tesis de doctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Hugo Condori

País/Idioma: Estados Unidos, Inglés

Palabras Clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

THz metamaterials and plasmonics using 2D materials & highly conductive transparent oxides (2017)

Tesis de doctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Sara Arezoomandan

País/Idioma: Estados Unidos, Inglés

Palabras Clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

Plasmonic metasurfaces and dynamic beam-steering at terahertz frequencies (2015)

Tesis de maestria

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Programa: Electrical Engineering

Tipo de orientación: Tutor único o principal

Nombre del orientado: James Hirst

País/Idioma: Estados Unidos, Inglés

Palabras Clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

Design of THz filters using a modified bisection method (2014)

Tesis de maestria

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Programa: Electrical Engineering

Tipo de orientación: Tutor único o principal

Nombre del orientado: Kai Yang

País/Idioma: Estados Unidos, Inglés

Palabras Clave: terahertz

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

OTRAS

Field effect devices in novel 2D materials (2019)

Otras tutorías/orientaciones

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Athena Shahrabi

País/Idioma: Estados Unidos, Inglés

Palabras Clave: FET

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información / Ingeniería Eléctrica y Electrónica

Graphene-based free form metamaterials (2018)

Otras tutorías/orientaciones

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Xinbo Wang

País/Idioma: Estados Unidos, Inglés

Palabras Clave: graphene

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica

TUTORÍAS EN MARCHA

POSGRADO

Terahertz imaging employing metamaterials (2019)

Tesis de doctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Prashanth Gopalan

País/Idioma: Estados Unidos, Inglés

Palabras Clave: imaging

Areas de conocimiento:

Ingeniería y Tecnología / Ingeniería Eléctrica, Ingeniería Electrónica e Ingeniería de la Información /

Ingeniería Eléctrica y Electrónica

Tutoría en marcha desde 2015, defensa esperada en 2020

Computational Design of Diffractive Optical Elements (2019)

Tesis de doctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Sourangsu Banerji

País/Idioma: Estados Unidos, Inglés

Synthesis and characterization of Ga₂O₃ (2019)

Tesis de doctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Jacqueline Cooke

País/Idioma: Estados Unidos, Inglés

OTRAS

Defects in Ga₂O₃ (2019)

Orientación de posdoctorado

Sector Extranjero/Internacional/Otros / The University of Utah , Estados Unidos

Tipo de orientación: Tutor único o principal

Nombre del orientado: Leila Ghadbeigi

País/Idioma: Estados Unidos, Inglés

Otros datos relevantes

PREMIOS, HONORES Y TÍTULOS

Outstanding Teaching Award (2019)

(Nacional)

ECE Department, University of Utah

Best paper award in Imaging Systems and Applications (2019)

(Internacional)

OSA Imaging and Applied Optics Congress

NSF CAREER award (2014)

(Nacional)
NSF

Eli J. and Helen Shaheen Graduate School Award in Engineering (2013)

(Internacional)
University of Notre Dame
The Shaheen award constitutes the highest honor bestowed on Notre Dame graduate students
<http://graduateschool.nd.edu/news/39848-graduate-school-announces-2013-shaheen-award-winners/>

First prize of the Engineering division at the Graduate Student Union Research Symposium 2013 (2013)

(Internacional)
University of Notre Dame

Best Student Paper Award at IRMMWTHz 2012 (2012)

(Internacional)
International Society of Infrared Millimeter and Terahertz waves

Third prize in the poster session of the 2012 Midwest Institute for Nano-electronics Discovery MIND-review (2012)

(Internacional)
Semiconductor Research Corporation (SRC)

Miembro del Sistema Nacional de Investigadores (SNI) en la categoría candidato a investigador (2009)

ANII

Dean's Fellowship (2009)

School of Engineering, University of Notre Dame

Premio del Público (muestra de proyectos de fin de carrera 2008) (2008)

IIE - Facultad de Ingeniería

Segundo Premio Area Potencia-Control (muestra de proyectos de fin de carrera 2008) (2008)

IIE - Facultad de Ingeniería

Segundo premio a trabajos estudiantiles en la First IEEE RAS Latin-American Summer School on Robotics 2007 (2007)

IEEE Latin America Robotics Council

Información adicional

PROYECTOS DE INVESTIGACION:

Research grants:

- NSF # 1936729 Reconfigurable free-form metamaterials: a new design paradigm for integrated optoelectronics based on 2D materials (08/2019 - 07/2022), \$ 380,000, personal share \$270,000 (PI).
- NSF # 1810096 Hybrid Organic-Inorganic Lead-Halide Perovskite-Based Active Terahertz Devices (08/2018 - 07/2021), \$ 375,000, personal share \$190,000 (PI).
- AFOSR # FA9550-18-1-0332: YIP AlGaIn & AlGaIn-based quantum wells: towards high-

frequency high-power electronics (08/2018-07/2021), \$360,000 (PI).

- AFOSR: Fundamentals of Doping and Defects in Ga₂O₃ for High Breakdown Field Electronics (09/2018-08/2021), \$1,500,000. Personal share \$300,000 (co-PI; PI M. Scarpulla, UofU).
- NSF #1828480 Acquisition of a 3-D Nanolithography System (08/2018-07/2021), ~\$880,000. Personal share \$175,000 (co-PI; PI S. Blair, UofU).
- NSF #1351389 CAREER: THz active metamaterials employing thin-film semiconductors (01/2014-12/2019), \$400,000 (PI).
- ONR #N00014-11-1-0721 MURI: DATE device and architectures for terahertz electronics (08/2013-12/2017), \$110,000 (UofU PI; PI P. Fay, UND).
- NSF #1644592 EAGER: Ultra-High-Performance Terahertz Detection Exploiting Super-Steep-Subthreshold-Slope (S₄)-FinFETs (08/2016-07/2018), project total \$150,000, personal share ~\$50,000 (co-PI; PI P.E. Gaillardon, UofU).
- NSF #1407959 ECCS: Closing the THz gap with a new family of devices based on two-dimensional materials (09/2014-08/2018), \$350,000 (PI).
- NSF #1121252 MRSEC: Plasmonics and Organic Spintronics (08/2013-08/2018). Currently working as an associated researcher of the center (IRG1); received support from the center for one graduate student for four and a half years (~\$110,000), acquire a microscope for setting up an exfoliation station for 2D materials (~\$25,000), cleanroom expenses (~\$40,000), and international travel expenses (~\$4,000). Total support received: ~\$180,000.

Contracts, gifts, and other forms of support:

- LUMOS Imaging INC, Characterization of hyper-spectral imaging cameras (09/2019, 12/2020), \$15,000.
- Amazon Web Services, Simulation of diffractive optical elements (01/2019, 12/2019), \$13,600.

FORMACION EN INVESTIGACION DE ESTUDIANTES DE GRADO:

Undergraduate Research Advised (5)

- Nicole Trometer; mentor, summer research experience for undergraduates program of the NSF Utah MRSEC center, summer 2017.
 - Coauthor of a journal paper (Journal of Applied Physics)
 - Currently pursuing PhD studies at North Carolina State University
- Jacqueline Cooke; mentor, summer research experience for undergraduates program of the NSF Utah MRSEC center, summer 2016.
 - Presented her work at AVS four corners symposium
 - Currently pursuing PhD studies at the University of Utah
- Nick Ramey; mentor, summer research experience for undergraduates program of the NSF Utah MRSEC center, summer 2015.
 - Coauthor of a journal paper (Carbon)
 - Currently pursuing PhD studies at the University of Michigan
- Cesar Nieves; mentor, summer research experience for undergraduates program of the NSF Utah MRSEC center, summer 2015.
 - Coauthor of a journal paper (Carbon)
 - Currently pursuing PhD studies at Penn State
- Nekasia Reynolds; mentor, summer research experience for undergraduates program of the NSF Utah MRSEC center, summer 2014.

SERVICIO Y GESTION:

- Director of graduate studies (Director de estudios de postgrado), ECE department, since 2018. Departmental Committee Service
- Member of the graduate committee ECE department (2014, 2015, 2016, 2017, 2018, 2019).
- Member of the faculty search committee, ECE department (2016).

Miscellaneous Departmental Service

- Graduate student committee member for 16 students (MS and PhD).
- Judge of posters for the GSAC student poster exhibition (2015).
- Judge of presentations for the ECE technical open house (2015, 2016, 2017, 2018).

College Committee Service

- Chair of the faculty search committee, MRSEC (2015).

University Committee Service

- Member of the UofU Nanofab SAL executive committee (2016).
- Member of the University SEED grant committee (2016, 2017, 2018).
- Member of the University teaching committee (2019).

Outreach activities

- Faculty advisor for the student chapter of the SPIE, University of Utah since September 2016.
- Faculty advisor for the student chapter of the Society of Hispanic Professional Engineers (SHPE), University of Utah since January 2014.

FORMACION DE OTROS ESTUDIANTES DE POSTGRADO:

-Mentor/Consultant for Students on Course Projects

Mentor for >30 student projects as part of Advanced Electromagnetic Fields and THz technology courses.

-Non-chair Member of Graduate Student Committees

Current:

ALAJMI,KHOLOUD GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

CHANANA,ASHISH GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

EDWARDS,RICHARD GERALD GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

GHOSH,CHAYANJIT GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

HASAN,MEHEDY GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

KOOHESTANMAHALIAN,FATEMEH GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

LIU,SHUWAN GSCGR Science (GR) PHYSPHD Physics PHD PHD

LOTFIZADEH,NEDA GSCGR Science (GR) PHYSPHD Physics PHD PHD

MEEM,MONJURUL FEEROZ GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

MISRA,SUDHAJIT GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

PRUZAN,DENNIS SCHMIDT GENGR Engineering (GR) MSE.PHD Materials Science & Engg PHD PHD

SALEH,MASHAD UDDIN GENGR Engineering (GR) ELENPHD Electrical & Comp Engg PHD PHD

WATERS,BROCK MARCUS GENGR Engineering (GR) ELENMS Electrical & Comp Engg MS MS

HONORES Y PREMIOS

Earned while at the University of Utah

Berardi Sensale-Rodriguez:

2019 ? Outstanding ECE teaching award. ECE department, University of Utah.

2019 ? Best paper award in Imaging Systems and Applications for his work on flat lenses for imaging at the OSA Imaging and Applied Optics Congress, Munich, Germany

2019 ? Recognized by the College of Engineering (COE) at the University of Utah as one of the 15% top instructors in the college.

2018 ? Recognized by the College of Engineering (COE) at the University of Utah as one of the 15% top instructors in the college.

2016- Invited participant at the National Academies Frontiers Meeting on Science Engineering and Medicine, Arab-American Frontiers Meeting, Abu Dhabi, UAE, November 2016.

2015- Selected as a ?bright mind on electronic materials and devices? to participate in the KAUST-NSF Research Conference on Electronic Materials, Devices and Systems for Sustainable Future, February 2015.

2014- Recognized by the College of Engineering (COE) at the University of Utah as one of the 15% top instructors in the college.

2014- NSF CAREER award, 01/2014 to 12/2019

His students:

Sara Arezoomandan:

2015 - Honorable mention at the ECE Graduate Poster Competition.

Hugo Condori:

2015- Second place at the ECE Graduate Poster Competition.

2015 - Student travel award to attend the APS/URSI conference 2015, Vancouver, Canada.

Sourangsu Banerji:

2019- Best paper award, OSA Applied Imaging Congress, 2019.

2018- Student poster award at the São Paulo School of Advanced Science (SPSAS) + XIV Jorge

André Swieca School on Nonlinear and Quantum Optics (SWIECA), 2018.
 2018- Finalist for student award at IRMMWTHz-2018, Nagoya, Japan. (runner up).
 Articles authored or co-authored by B. Sensale-Rodriguez:
 2018 ? H. Condori et al., Journal of Applied Physics. Chosen as Editor?s pick.
 2017 ? J. Encomendero et al., Physical Review X. Featured by Semiconductor Today.
 2016 ? S. Arezoomandan et al., APL Materials. Among the most downloaded articles published in 2016 and 2017.
 2014 ? K. Yang et al., Applied Physics Letters. Selected by Assoc. Editor A. Tredicucci in his short-list of ?must-read findings on Terahertz devices?.
 2013 ? B. Sensale-Rodriguez, Applied Physics Letters. Among the most accessed articles in 2014.

PAPERS EN CONFERENCIAS CIENTIFICAS:

? Conference papers (63):

a. After joining the university of Utah (45):

(Sensale-Rodriguez?s group student authors highlighted in bold)

C1- HASAN, M.; SENSALERODRIGUEZ, B.; On the Effect of Quantum Capacitance in Graphene FET THz Detectors. In: IRMMWTHz 2019, Paris, France. 2019.

C2- AREZOOMANDAN, S.; CONDORI, H.; SENSALERODRIGUEZ, B.; Extraordinary THz Absorption In 2D Material-dielectric Integrated Metasurfaces. In: IRMMWTHz 2019, Paris, France. 2019.

C3- BANERJI, S.; MEEM, M.; MENON, R.; SENSALERODRIGUEZ, B.; Multi-Level Diffractive Lenses for Real-Time Long-Wave IR Imaging. In: 2019, Paris, France. 2019.

C4- BANERJI, S.; MEEM, M.; MAJUMDER, A.; SENSALERODRIGUEZ, B.; MENON, R.; Imaging with ultra-lightweight flat lenses: visible near-IR to long-wave IR. In: SPIE Optics + Photonics, San Diego, CA. 2019.

C5- BANERJI, S.; SENSALERODRIGUEZ, B.; 3D-printed diffractive terahertz optical elements through computational design. In: SPIE Defense + Commercial Sensing, Baltimore, MD, 2019.

C6- BANERJI, S.; MEEM, M.; SENSALERODRIGUEZ, B.; MENON, R.; Metalenses or diffractive lenses for imaging? In: OSA Imaging and Applied Optics Congress, Munich, Germany, 2019.

C7- BANERJI, S.; MEEM, M.; MAJUMBER, A.; MENON, R.; SENSALERODRIGUEZ, B.; Achromatic Broadband Diffractive Lenses for Focusing and Imaging in LWIR. In: OSA Imaging and Applied Optics Congress, Munich, Germany, 2019.

C8- MEEM, M.; BANERJI, S.; MAJUMBER, A.; SENSALERODRIGUEZ, B.; MENON, R.; Flat Lenses for Ultra-lightweight Longwave-Infrared Broadband Imaging. In: CLEO 2019, San Jose, CA, 2019.

C9- MAJUMDER, A.; BANERJI, S.; MIYAGAWA, M.; MEEM, M.; SENSALERODRIGUEZ, B.; MENON, R.; Programmable metamaterials & metasurfaces for ultra- compact multi-functional photonics. In: CLEO 2019, San Jose, CA, 2019.

C10- GOPALAN, P.; CHANANA, A.; KRISHNAMOORTHY, S.; NAHATA, A.; SCARPULLA, M.; SENSALERODRIGUEZ, B.; Ultrafast Terahertz Modulator Based on Metamaterial-integrated WSe₂ Thin-films. Keynote. In: IRMMWTHz 2018, Nagoya, Japan. 2018.

C11? CHANANA, A.; WINGER, J.; GOPALAN, P.; LOFTIZADEH, N.; DESHPANDE, V.; SCARPULLA, M.; NAHATA, A.; SENSALERODRIGUEZ, B.; Strong Terahertz Plasmonic Resonances in Thin-film Cd₃As₂: A Three- dimensional Dirac Semimetal. Keynote. In: IRMMWTHz 2018, Nagoya, Japan. 2018.

C12? BANERJI, S.; CHANANA, A.; CONDORI, H.; AREZOOMANDAN, S.; NAHATA, A.; SENSALERODRIGUEZ, B.; Demonstration Of Computational THz Diffractive Optical Elements Enabled by a Modified Direct Binary Search Technique. Keynote. In: IRMMWTHz 2018, Nagoya, Japan. 2018.

C13? CONDORI, H.; CHANANA, A.; ENCOMENDERO, J.; ZHU, M.; CAO, Y.; NAHATA, A.; XING, H. G.; SENSALERODRIGUEZ, B.; Synchronized Plasma Wave Resonances in Ultrathin-membrane GaN Heterostructures. In: IRMMWTHz 2018, Nagoya, Japan. 2018.

C14? BANERJI, S.; CHANANA, A.; CONDORI, H.; NAHATA, A.; SENSALERODRIGUEZ, B.; Modified direct binary search: an algorithm for designing aberration corrected diffractive THz lenses. In: SPIE Optics + Photonics, San Diego, CA. 2018.

C15? BANERJI, S.; CHANANA, A.; CONDORI, H.; NAHATA, A.; SENSALERODRIGUEZ, B.; Efficient Design of Diffractive THz Lenses for Aberration Rectified Focusing via Modified Binary Search Algorithm. In: CLEO 2018, San Jose, CA, USA. 2018.

C16? AREZOOMANDAN, S.; PRAKASH, A.; JALAN, B.; SENSALERODRIGUEZ, B.; Terahertz spectroscopy and demonstration of visible-transparent/terahertz-functional electromagnetic structures in La-doped BaSnO₃ films. In: Photonics West 2018, San Francisco, CA. 2018.

C17? CHANANA, A.; WINGER, J.; GOPALAN, P.; LOFTIZADEH, N.; DESHPANDE, V.; SCARPULLA, M.; NAHATA, A.; SENSALERODRIGUEZ, B.; Strong terahertz plasmonic resonances in thin-film cadmium arsenide: a 3D topological Dirac semimetal. Invited. In: Photonics West 2018, San Francisco, CA. 2018.

C18? CHANANA, A.; GOPALAN, P.; CONDORI, H.; SENSALERODRIGUEZ, B.; NAHATA, A.; Terahertz Conductivity and Scattering in Few-layer Stacked Graphene. In: IRMMWTHz 2017,

Cancun, Mexico. 2017.

C19? WANG, Y.; BANERJI, S.; MAO, J.; AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; BLAIR, S.; Modification of UV Surface Plasmon Resonances in Aluminum Hole-Arrays with Graphene. In: SPIE Optics + Photonics, San Diego, CA. 2017.

C20? WANG, X.; SENSALÉ-RODRIGUEZ, B.; Designer metamaterials using graphene for integrated nano-photonics applications. In: SPIE Optics + Photonics, San Diego, CA. 2017.

C21? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; THz beam-steering using VO₂ deep-subwavelength metamaterials. In: SPIE Optics + Photonics, San Diego, CA. 2017.

C22? CONDORI, H.; CHANANA, A.; ENCOMENDERO, J.; ZHU, M.; CAO, Y.; NAHATA, A.; XING, H. G.; SENSALÉ-RODRIGUEZ, B.; Strong terahertz wave coupling to plasmons in grating-grate GaN HEMT arrays. In: Device Research Conference (DRC), Late News, Notre Dame, IN. 2017.

C23? WANG, Y.; BANERJI, S.; MAO, J.; AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; BLAIR, S.; Modification of UV Surface Plasmon Resonances in Aluminum Hole-Arrays with Graphene. In: CLEO 2017, San Jose, CA, USA. 2017.

C24? AREZOOMANDAN, S.; YAN, R.; GOPALAN, P.; TIAN, K.; CHANANA, A.; TIWARI, A.; XING, H. G.; NAHATA, A.; SENSALÉ-RODRIGUEZ, B.; Near-field Enhancement and Optimal Performance in Metamaterial Terahertz Modulators Based on 2D-materials. In: 14th International Conference of Near-Field Optics, Nanophotonics and Related Techniques (NFO-14), Hamamatsu, Japan. 2016.

C25? HASAN, M.; GAILLARDON, P.E.; SENSALÉ-RODRIGUEZ, B.; Perspectives of DIG FinFETs for Efficient Terahertz Detection Applications. In: SPIE Optics + Photonics, San Diego, CA. 2016.

C26? CONDORI, H.; ENCOMENDERO, J.; XING, H. G.; SENSALÉ-RODRIGUEZ, B.; Terahertz Plasmon Amplification in RTD-gated HEMTs with a Grating-gate. In: SPIE Optics + Photonics, San Diego, CA. 2016.

C27? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; High-Q terahertz reconfigurable metamaterials using graphene. In: SPIE Optics + Photonics, San Diego, CA. 2016.

C28? AREZOOMANDAN, S.; CONDORI, H.; CHANANA, A.; XU, P.; NAHATA, A.; JALAN, B.; SENSALÉ-RODRIGUEZ, B.; Terahertz conductivity of ultra-high electron concentration 2DEGs in NTO/STO heterostructures. In: SPIE Optics + Photonics, San Diego, CA. 2016.

C29? CONDORI, H.; ENCOMENDERO, J.; XING, H. G.; SENSALÉ-RODRIGUEZ, B.; Simulation of Power Gain at THz Frequencies Employing Grating-gate RTD-gated HEMTs. In: Lester Eastman Biennial Conference on High Performance Devices, Bethlehem, PA. 2016.

C30? HASAN, M.; GAILLARDON, P.E.; SENSALÉ-RODRIGUEZ, B.; A Compact DC Model for Dual-Independent-Gate FinFETs. In: Device Research Conference (DRC) 2016, Newark, DE, USA. 2016.

C31? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Tunable THz metamaterial and plasmonic devices based on graphene. In: CLEO 2016, San Jose, CA, USA. 2016.

C32? GAILLARDON, P.E.; HASAN, M.; AHMED, T.; WALKER, R.; SENSALÉ-RODRIGUEZ, B.; Digital, Analog and RF Design Opportunities of Three-Independent-Gate Transistors. In: ISCAS 2016, Montreal, Canada. 2016.

C33? GAILLARDON, P.E.; MAGNI, R.; AMARU, L.; HASAN, M.; WALKER, R.; SENSALÉ-RODRIGUEZ, B.; CHRISTMANN, F.; BEIGNE, E.; Three-Independent-Gate Transistors: Opportunities in Digital, Analog and RF Applications. In: IEEE Latin-American Test Symposium (LATS), Foz de Iguaçu, Brazil. 2016.

C34? ARZOOMANDAN, S.; YANG, K.; CONDORI, H.; RAMEY, N.; NIEVES, C.; SENSALÉ-RODRIGUEZ, B.; Reconfigurable terahertz plasmonics and metamaterials using graphene. In: 10th European Conference on Antennas and Propagation (EuCAP), Davos, Switzerland. 2016.

C35? GAILLARDON, P.E.; WALKER, R.; SENSALÉ-RODRIGUEZ, B.; Breakthroughs in Analog and RF Circuit Performance through Steep-Slope FinFETs. In: Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Orlando, FL, USA. 2016.

C36? CONDORI, H.; SENSALÉ-RODRIGUEZ, B.; Effect of Electron Momentum Relaxation Time on The Terahertz Plasmonic Properties of Graphene Structures. In: IRMMWTHz 2015, Hong Kong. 2015.

C37? BHARDWAJ, S.; SENSALÉ-RODRIGUEZ, B.; XING, H.; VOLAKIS, J.; Full-Wave Hydrodynamic Model for Predicting THz Emission from Grating-Gate RTD-Gated Plasma Wave HEMTs. In: Device Research Conference (DRC) 2015, Columbus, OH. 2015.

C38? HASAN, M.; SENSALÉ-RODRIGUEZ, B.; Two-dimensional distributed effects in graphene SymFETs. In: Device Research Conference (DRC) 2015, Columbus, OH. 2015.

C39? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; A deep subwavelength metamaterial terahertz phase modulator. In: IRMMWTHz 2014, Tucson, AZ. 2014.

C40? YANG, K.; AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Design of THz filters using a modified bisection method. In: IRMMWTHz 2014, Tucson, AZ. 2014.

C41? FAY, P.; XIE, Y.; ZHAO, Z.; JIANG, Z.; RAHMAN, S.; XING, H.; SENSALÉ-RODRIGUEZ, B.; LIU, L.; Emerging Electronic Devices for THz Sensing and Imaging. Invited. In: SPIE Optics + Photonics, San Diego, USA. 2014.

C42? ABOT, J. L.; ALOSH, T.; BAJAR, A.; RENNER, D.; GOOD, E.; SENSALÉ-RODRIGUEZ, B.; AREZOOMANDAN, S.; BELAY, K.; Coupled mechanical and electrical response of carbon nanotube

yarn sensors for self-sensing composite materials. In: 29th American Society for Composites Conference, San Diego, CA. 2014.

C43? AREZOOMANDAN, S.; YANG, K.; SENSALÉ-RODRIGUEZ, B.; Active control of THz light propagation through graphene-based electrically reconfigurable metasurfaces. Invited. In: META 2014 Conference, Singapore. 2014.

C44? SENSALÉ-RODRIGUEZ, B.; XING, H.G.; Reconfigurable THz devices using graphene. Invited. In: SPIE Optics + Photonics, San Diego, USA. 2013.

C45? SENSALÉ-RODRIGUEZ, B.; ZHAO, P.; JENA, D.; XING, H.G.; Perspectives of Graphene SymFETs for THz Applications. In: IRMMWTHz 2013, Mainz, Germany. 2013.

b. Before joining the university of Utah (18):

C46? ENCOMENDERO-RISCO, J.; SENSALÉ-RODRIGUEZ, B.; XING, H.G.; Noise Performance Of RTD-gated Plasma-wave HEMT THz Detectors. In: IRMMWTHz 2013, Mainz, Germany. 2013.

C47? YAN, R.; LIU, L.; SENSALÉ-RODRIGUEZ, B.; XING, H.G.; Near-field Enhanced Graphene Terahertz Modulator. Invited. In: IRMMWTHz 2013, Mainz, Germany. 2013.

C48? ASTESSIANO, D.; CANETTI, R.; ROMERO, P.; SENSALÉ-RODRIGUEZ, B.; Fisho: A Cost-Effective Intelligent Autonomous Robot Fish. In: IEEE Int. Conference on Advanced Robotics (ICAR) 2013, Montevideo, Uruguay. 2013.

C49? YAN, R.; RAFIQUE, S.; Li, W.; Liang, X.; JENA, D.; LIU, L.; SENSALÉ-RODRIGUEZ, B.; XING, H.G.; Tunable Graphene-based Metamaterial Terahertz Modulators. In: CLEO 2013, San Jose, CA, USA. 2013.

C50? ZHANG, H.; ZHU, M.; SENSALÉ-RODRIGUEZ, B.; XING, H.G.; THz plasmonic absorption in periodically patterned semiconductor structures. In: Int. Wireless Symposium (IWS) 2013, Beijing, China. 2013.

C51? SENSALÉ-RODRIGUEZ, B.; YAN, R.; RAFIQUE, S.; ZHU, M.; PROTASENKO, V.; JENA, D.; LIU, L.; XING, H.G.; Exceptional Tunability of THz Reflectance in Graphene Structures. Invited. Best student paper award. In: IRMMWTHz 2012, Wollongong, Australia. 2012.

C52? PATHAK, R.; CHENG, L.; SENSALÉ-RODRIGUEZ, B.; WANG, T.; LIU, L.; Mapping and sensing microfluidic chemical reactions using a frequency domain terahertz system. In: IRMMWTHz 2012, Wollongong, Australia. 2012.

C53? SENSALÉ-RODRIGUEZ, B.; LU, Y.; BARBONI, L.; SILVEIRA, F.; FAY, P.; JENA, D.; SEABAUGH, A.; XING, H.G.; Perspectives of TFETs for low power analog ICs. In: IEEE Subthreshold Microelectronics Conference 2012, Boston, USA. 2012.

C54? SONG, B.; SENSALÉ-RODRIGUEZ, B.; KETTERSON, A.; SCHUETTE, M.; BEAM, E.; SAUNIER, P.; GAO, X.; GUO, S.; FAY P.; JENA, D.; XING, H.G.; Monolithically Integrated E/D-mode InAlN HEMTs with $f_t/f_{max} > 200/220$ GHz. In: Device Research Conference 2012 (DRC), State College, PA USA. 2012.

C55? SENSALÉ-RODRIGUEZ, B.; GUO, J.; WANG, R.; LI, G.; FANG, T.; SAUNIER, P.; KETTERSON, A.; SHCUETTE, M.; SNIDER, G.; FAY P.; JENA, D.; XING, H.G.; Comparative Study of E- and D-mode InAlN/AlN/GaN HEMTs with f_T Near 200 GHz. In: Int. Semiconductor Dev. Res. Symposium 2011 (ISDRS), College Park, MD USA. 2011.

C56? LIU L.; SENSALÉ-RODRIGUEZ, B.; ZHANG Z.; XING H.G.; FAY P.; Development of Microwave and THz Detectors Utilizing AlN/GaN High Electron Mobility Transistors. In: Proceedings 21st International Symposium on Space Terahertz Technology 2010, Oxfordshire, UK. 2010.

C57? SENSALÉ-RODRIGUEZ, B.; FIORELLI, R.; SILVEIRA, F.; Common Source LNA Design Space Exploration in All Inversion Regions. In: IBERCHIP Workshop 2009 (IWS2009), 2009 Buenos Aires, Argentina Proceedings IBERCHIP Workshop 2009. 2009.

C58? LEITAO, V.; SENSALÉ COZZANO, B.; SENSALÉ-RODRIGUEZ, B.; Trefftz collocation for frequency domain elastodynamic problems. In: BEM/MRM XXXI, New Forest, UK. 2009. (WIT Transactions on Modelling and Simulation, v. 49, p. 281-291, 2009).

C59? SENSALÉ-RODRIGUEZ, B.; SENSALÉ COZZANO, B.; Analysis of Microstrip Patch Antennas Using the Trefftz Mesh-Free Method. In: Proceedings of the 2008 Leuven Symposium on Applied Mechanics in Engineering (Fifth Workshop on Trefftz Methods), Trefftz.08., Leuven, Belgium- CD-ROM. 2008.

C60? SENSALÉ-RODRIGUEZ, B.; SENSALÉ COZZANO, B.; LEITAO, V.; MFS analysis of Microstrip Antennas. In: MFS 2007, Ayia Napa, Cyprus. 2007, 19 pages. (Chapter 16 of the book entitled: ?The Method of Fundamental Solutions ? A Meshless Method? -Eds. A. Karageorghis et al., Dynamic Publishers Inc., Atlanta GA., USA. ISBN 1980888-04-4).

C61? SENSALÉ COZZANO, B.; SENSALÉ-RODRIGUEZ, B.; Resolución de problemas gobernados por la ecuación $\nabla u = b(x,y,u)$, para un operador b lineal en u , por el método de Trefftz. In: Proceedings of 2006 International Congress of Numerical Methods in Engineering and Applied Sciences CIMENICS?2006, Isla Margarita, Venezuela. (Paper; ISBN: 9800023151). 2006.

C62? SENSALÉ COZZANO, B.; SENSALÉ-RODRIGUEZ, B.; HERSKOVITS, J.; Shape sensitivity analysis in planar elasticity using the element-free Trefftz method. In: 6th World Congress on

Structural and Multidisciplinary Optimization (WCSMO'06), Rio de Janeiro, Brazil. 2006.
C63? SENSALÉ COZZANO, B.; SENSALÉ-RODRIGUEZ, B.; Aplicación Del Método De Trefftz A Viscoelasticidad. In: VIII Congreso Argentino de Mecánica Computacional, Buenos Aires, Argentina. 2005, (Mecánica Computacional, Volume XXIV. Number 3. Constitutive Modelling of Materials, p. 345-362, 2005).

? Conference Abstracts (19)

a. After joining the university of Utah (15):

(Sensale-Rodriguez's group student authors highlighted in bold)

A1? MAGGINETTI, D. J.; CHENG, X.; GOPALAN, P.; SENSALÉ-RODRIGUEZ, B.; YOON, H. P.; Large-Area MoTe₂ Layer Growth Using High-Vacuum Ampoule Process. In: Electronic Materials Conference (EMC), Santa Barbara, CA USA. 2018.

A2? GOPALAN, P.; CHANANA, A.; KRISHNAMOORTHY, S.; NAHATA, A.; SCARPULLA, M.; SENSALÉ-RODRIGUEZ, B.; Exploring Transient Terahertz Carrier Dynamics in Large-Area WSe₂ Thin Films. In: Electronic Materials Conference (EMC), Santa Barbara, CA USA. 2018.

A3? WANG, Y.; DICKENS, P.; NI, X.; LOTUBAI, E.; SPRAWLS, S.; LIU, F.; KRISHNAMOORTHY, S.; BLAIR, S.; LYNN, K.; SCARPULLA, M.; SENSALÉ-RODRIGUEZ, B.; Photoluminescence from γ -Ga₂O₃ Bulk Crystals? Spectral Dependences on Incident Wavelength and Polarization. In: Electronic Materials Conference (EMC), Santa Barbara, CA USA. 2018.

A4? CONDORI, H.; CHANANA, A.; ENCOMENDERO, J.; NAHATA, A.; JENA, D.; XING, H.; SENSALÉ-RODRIGUEZ, B.; Cooperative THz to plasmon coupling in HEMT-array ultrathin membranes. In: IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting, Boston, MA, USA, 2018.

A5? BANERJI, S.; CHANANA, A.; CONDORI, H.; NAHATA, A.; SENSALÉ-RODRIGUEZ, B.; Aberration Rectified THz Beam Focusing via Diffractive Lens Design Using a Modified Direct Binary Search Algorithm. In: IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting, Boston, MA, USA, 2018.

A6? CHANANA, A.; WINGER, J.; GOPALAN, P.; NAHATA, A.; SCARPULLA, M.; SENSALÉ-RODRIGUEZ, B.; Large-area Deposition of Cadmium Arsenide Films using Thermal Deposition. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2017.

A7? CONDORI, H.; CHANANA, A.; ISLAM, S. M.; NAHATA, A.; JENA, D.; SENSALÉ-RODRIGUEZ, B.; Terahertz spectroscopy of strained AlN/GaN/AlN quantum wells. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2017.

A8? BANERJI, S.; WANG, Y.; MAO, J.; AREZOOMANDAN, S.; BLAIR, S.; SENSALÉ-RODRIGUEZ, B.; UV Surface Plasmon Resonance Modification in Aluminum Nanohole-Arrays Using Graphene. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2017.

A9? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Fundamental Bounds for the Resonance Strength in Graphene Plasmonic Structures. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2017.

A10? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Geometrical tradeoffs in designing deep subwavelength graphene based metamaterials. In: META'15, New York, NY USA. 2015.

A11? CONDORI, H.; ENCOMENDERO, J.; XING, H.; SENSALÉ-RODRIGUEZ, B.; Amplification of THz Plasmons in Grating-Gate RTD-Gated HEMTs. In: Electronic Materials Conference (EMC), Columbus, OH USA. 2015.

A12? AREZOOMANDAN, S.; XU, P.; JALAN, B.; SENSALÉ-RODRIGUEZ, B.; THz Spectroscopy of NdTiO₃/SrTiO₃ Heterostructures Towards Plasmonic Applications. In: Electronic Materials Conference (EMC), Columbus, OH USA. 2015.

A13? CONDORI, H.; SENSALÉ-RODRIGUEZ, B.; Power Gain at THz Frequencies Employing Grating-gate RTD-gated HEMTs. In: IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting, Vancouver BC, Canada, 2015.

A14? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Enhanced control of THz optical conductivity in graphene via optimal extraordinary optical transmission electrode design. In: APS March Meeting, Denver, CO USA. 2014.

A15? AREZOOMANDAN, S.; SENSALÉ-RODRIGUEZ, B.; Deeply-Scaled Graphene-Based Electrically Reconfigurable Metasurfaces. In: Electronic Materials Conference (EMC), Santa Barbara, CA USA. 2014.

b. Before joining the university of Utah (4):

A16? YAN, R.; RAFIQUE, S.; LI, W.; LIAN, X.; JENA, D.; LIU, L.; SENSALÉ-RODRIGUEZ, B.; XING, H. G.; Tunable Electro-Absorption Metamaterial-Based Graphene. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2013.

A17? SENSALÉ-RODRIGUEZ, B.; RAFIQUE, S.; PROTASENKO, V.; YAN, R.; ZHU, M.; JENA, D.; LIU, L.; XING, H. G.; Graphene electrically reconfigurable patterns for THz imaging applications. In: APS March Meeting, Baltimore, MD USA, 2013.

A18? SENSAL RODRIGUEZ, B.; YAN, R.; KELLY, M.; FANG, T.; JENA, D.; LIU, L.; Xing, H. G.; Frequency Domain THz Characterization of Graphene. In: Electronics Materials Conference (EMC), Santa Barbara, CA USA. 2011.

A19? SENSAL RODRIGUEZ, B.; LIU L.; ZHANG Z.; FAY P.; XING H.G.; Initial Studies on Microwave and Terahertz detection using AlN/GaN HEMTs. In: Electronic Materials Conference (EMC), Notre Dame, IN USA. 2010.

CHARLAS EN CONFERENCIAS CIENTIFICAS

The list below is incomplete and restricted only to talks delivered by Dr. Sensal-Rodriguez.

1. 2018 ??Graphene and Dirac materials beyond graphene: applications in THz metamaterials and plasmonics?, European Microwave Conference (EuMW 2018), Madrid, Spain. Invited speaker (English).
2. 2018 ??Incident wavelength and polarization dependence of spectral shifts in ?Ga2O3 photoluminescence?, US Workshop on Gallium Oxide. Ohio State University. (English).
3. 2018 - ?Synchronized Plasma Wave Resonances In Ultrathin-membrane GaN Heterostructures? IRMMWTHz 2018, Nagoya, Japan. Keynote talk. (English)
4. 2017 ??Graphene and Dirac materials beyond graphene: plasmonics at extreme spectral wavelengths?, IWPSD 2017, IIT Delhi, India. Invited speaker (English).
5. 2017 ??Large-area Synthesis of Thin-Film Cadmium Arsenide: a 3D Topological Dirac Semimetal, for Terahertz Plasmonic Applications?, RJUSE TeraTech 2017, Rensselaer Polytechnic Institute, Troy, NY. Invited speaker (English).
6. 2017 ??Graphene-based Terahertz Optoelectronic devices?, European Microwave Conference (EuMW 2017), Nuremberg, Germany. Invited speaker (English).
7. 2017 ??Wide bandgap semiconductors & devices: frequency limits, terahertz properties, and terahertz applications??. Third International Workshop on THz Tech (IWOTT 2017). (English)
8. 2016 ? "Amazing Optical Properties of Graphene", SPIE distinguished lecture at IIT Roorkee, India. (English).
9. 2016 ??Extending the frontiers of (opto)electronics with atom-thick materials?, 4th Arab-American frontiers of Science, Engineering, and medicine symposium, Abu Dhabi, United Arab Emirates. Invited by the National Academy of Sciences. (English).
10. 2016 ??Graphene-based Terahertz Optoelectronic devices?, European Microwave Conference (EuMW 2016), London, UK. Invited speaker (English).
11. 2016 ??Near-field Enhancement and Optimal Performance in Metamaterial Terahertz Modulators Based on 2D-materials.? 14th International Conference of Near-Field Optics, Nanophotonics and Related Techniques (NFO-14), Hamamatsu, Japan. (English)
12. 2016 ??Near-field Enhancement and Optimal Performance in Metamaterial Terahertz Modulators Based on 2D-materials.? Latin America Optics and Photonics Conference LAOP 2016, Medellin, Colombia. (English)
13. 2016 ??Reconfigurable terahertz plasmonics and metamaterials using graphene? EUCAP 2016, Davos, Switzerland. (English).
14. 2016 ??Enabling High-Speed and Terahertz Electronics with Atom Thick Materials?, ECE seminar at Boise State University, ID. Invited seminar (English).
15. 2015 ??Terahertz properties and applications of graphene?, GrapheneCanada 2015, Montreal, Canada. Invited speaker (English).
16. 2015 ??Graphene-based Terahertz Optoelectronic devices?, European Microwave Conference (EuMW 2015), Paris, France. Invited speaker (English).
17. 2015 ??Effect of electron momentum relaxation time on the terahertz plasmonic properties of graphene structures?, IRMMWTHz 2015, Hong Kong. (English)
18. 2015 ??Terahertz plasmonics and metamaterials in tunable 2DEGs?, KAUST-NSF Conference on Electronic Materials, Devices and Systems for a Sustainable Future 2015, Jeddah, Saudi Arabia. Invited speaker (English).
19. 2014 ??Graphene based optoelectronics?, Thales Research, Paris, France. Invited seminar (English).
20. 2014 ??Graphene-based Terahertz Optoelectronic devices?, European Microwave Conference (EuMW 2014), Rome, Italy. Invited speaker (English).
21. 2014 ??Graphene based optoelectronics?, European Conference on Optical Communications (ECOC 2014), Cannes, France. Invited tutorial speaker (English).
22. 2014 ??Reconfigurable Metamaterial Terahertz Filters based on graphene?, Metamaterials conference 2014, Copenhagen, Denmark. (English)
23. 2014 ??Design, simulation, and fabrication of a novel reconfigurable graphene terahertz filter?, SPIE Optics+Photonics, San Diego CA, USA. (English)
24. 2014 ??Resonant-tunneling-enhanced plasmonic terahertz devices?, SPIE Defense+Security, Baltimore MD, USA. Invited speaker (English)
25. 2014 ??Graphene based THz devices?, invited seminar delivered at: Institute of Microelectronics ? Chinese Academy of Sciences, Beijing; Institute of Microelectronics, Peking

- University; College of Chemistry and Chemical Engineering, Xiamen University; China. (English)
26. 2014 ??Active control of THz light propagation through electrically reconfigurable metasurfaces? META?14, Singapore, Singapore. Invited speaker (English).
 27. 2014 ??Single pixel Terahertz imaging towards bio-medicine applications? URSI National Radio Science Meeting, Boulder CO, USA. Invited speaker (English).
 28. 2014 ??Graphene based THz/Optical reconfigurable components? US-Danish workshop on microwave photonics, Berkeley CA, USA. Invited speaker (English).
 29. 2013 ??Perspectives of Graphene SymFETs for THz Applications? IRMMWTHz 2013, Mainz, Germany. (English)
 30. 2013 ??Graphene based THz/Optical reconfigurable components? IEEE topical meeting on Microwave Photonics, Alexandria VA, USA. Invited speaker (English).
 31. 2013 ??Tunable Graphene Terahertz Optoelectronic Devices? seminar presentation at 4th SICAST, Shenzhen, China. Invited speaker (English).
 32. 2013 ??Graphene electrically reconfigurable patterns for THz imaging applications? APS March Meeting, Baltimore MD, USA. (English)
 33. 2013 ??Terahertz and high frequency electronics employing tunable 2DEG systems? ECE colloquium, University of Utah, Salt Lake City UT, USA. (English)
 34. 2013 ??Closing the THz gap with tunable 2DEG systems? EE colloquium, University of California at Riverside, Riverside CA, USA. (English)
 35. 2013 ??Terahertz and high frequency electronics employing tunable 2DEG systems? ECE special seminar, University of Illinois at Urbana Champaign, Urbana Champaign IL, USA. (English)
 36. 2013 ??Closing the THz gap with tunable 2DEG systems? IEEE AP-MTT seminar, The Ohio State University, Columbus OH, USA. (English)
 37. 2013 ??Tunable Electro-Absorption Metamaterial-Based Graphene Terahertz Modulators? Electronic Materials Conference, U. of Notre Dame, Notre Dame IN, USA. (English)
 38. 2012 ??Graphene THz Intensity Modulators? Solid State Seminar, Dept. of E.E., U. of Notre Dame, USA. (English)
 39. 2012 ??Modulation of THz waves in graphene structures enabled by intraband transitions? Seminar of the Physics Department ? UFRGS, Brazil. (Portuguese)
 40. 2012 ??Exceptional Tunability of THz Reflectance in Graphene Structures.? IRMMWTHz 2012 ? University of Wollongong, Australia. Invited oral presentation. (English)
 41. 2012 ??Enhanced Terahertz detection in resonant tunnel diode-gated HEMTs? SBMicro 2012 ? UFB, Brasilia, Brazil. (English)
 42. 2012 ??Perspectives of TFETs for low power analog ICs? IEEE Subthreshold Microelectronics Conference 2012, Boston MA, USA. (English)
 43. 2012 ??THz reconfigurable optoelectronic devices employing graphene? International Symposium in Compound Semiconductors (ISCS 2012), UCSB, Santa Barbara CA USA. (English)
 44. 2012 ??Active THz metamaterials based on self-gated 2DEGs? Lester Eastman Biennial Conference, Brown University, Providence RI, USA. (English)
 45. 2012 ??Reconfigurable THz devices using graphene? TeraNano 2012 ? Hawaii, USA. Invited talk (English)
 46. 2011 ??Frequency Domain THz Characterization of Graphene? Electronic Materials Conference, UCSB, Santa Barbara CA, USA. (English)
 47. 2011 ??Comparative Study of E- and D-mode InAlN/AlN/GaN HEMTs with fT Near 200 GHz? International Semiconductor Device Research Symposium ? U. of Maryland, USA. (English)
 48. 2010 ??Initial Studies on Microwave and Terahertz detection using AlN/GaN HEMTs? Electronic Materials Conference ? U. of Notre Dame, USA. (English)
 49. 2010 ??FET THz detectors in the quantum capacitance limited region? Lester Eastman Biennial Conference ? RPI, Troy NY, USA. (English)
 50. 2009 ??Common source LNA design space exploration in all inversion regions? IBERCHIP workshop ?Buenos Aires, Argentina. (English)
 51. 2008 ??The boundary element method in engineering? Seminar of Applied Mathematics ? Universidad de la República, Uruguay. (Spanish)
 52. 2008 - ?Analysis of Microstrip Patch Antennas Using the Trefftz Mesh-Free Method? Fifth Workshop on Trefftz Methods ? KU Leuven, Belgium. (English)

DIFUSION

[1] Thin to Win ? News Wise, November 2019.

[2] Ultra-thin lens being developed in Utah to change future smartphones and drones - Fox 13 News, November 2019.

[3] New Lens Could Provide Thermal Imaging Capabilities in More Compact Camera ? Photonics.com, November 2019.

[4] New lens 20 times thinner than human hair set to replace camera bumps - Daily Mail UK, November 2019.

[5] Engineers develop thin, lightweight lens that could produce slimmer camera phones, longer-flying drones - Science Daily, November 2019.

[6] New lens design could lead to slimmer smartphones, longer-flying drones - The Times of India (ET Telecom), November 2019.

Indicadores de producción

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