

PERSONAL INFORMATION

Marilena Vivona

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WORK EXPERIENCE

30th Sep 2019 up to now

Permanent member of Research Staff at National Research Council (CNR) of Italy - Institute for Microelectronics and Microsystems (IMM) of Catania (Italy)

Micro/Nano Electronics domain

Experimental investigation on advanced Silicon Carbide (SiC) devices for high Power Electronics applications. Electrical, morphological and structural characterizations of MOS capacitors, Ohmic and Schottky contacts.

Skills

- Atomic Force Microscopy applying various configurations (AFM, C-AFM).
- I-V and C-V characterizations of MOS capacitors, Schottky and Ohmic contacts. TLM characterization. Oxide reliability testing stressed by thermal ageing.
- Sample preparation for TEM analysis Structural Analysis (XRD, TEM, EDX, SEM): arrangement of the results, measurements supported by technical operator.
- Clean-room (ISO 4) operations for device fabrication: processing of devices (cleaning, laser beam lithography (with technician), thermal oxidation, metal deposition by rf-magnetron sputtering, wet and dry etching, thermal treatments).

3rd May 2019 - 30th June 2019

Visiting Researcher at the Opto-Electronics Research Centre (ORC) - University of Southampton (UK)

1st Apr 2016 - 31st March 2019

Research Fellow at the Opto-Electronics Research Centre (ORC) - University of Southampton (UK)

Bldg 53 - Highfield Campus - University of Southampton - SO17 1BJ Southampton UK

Research Fellow in the Preform Rare-Earth Profiler (PREP) project (P.I.: Prof. M. N. Zervas).

Optics domain

Design, Development and Test of an imaging and detection platform for Optical Preform Profiling. Specifically:

- Refractive index profiling by transmitted-ray deflection measurements.
- Active-dopant distribution and concentration evaluation in Rare-Earth-doped optical preforms through computed tomography-like technique. Application of the Inverse Radon and Abel transforms to rebuild the Rare-Earth ion profile in the core of the optical preform.

Skills

- Scientific and financial Interaction with optical and electronic components suppliers.
- Set-up of optoelectronic benches for investigations and material validations.
- Transformation Optics.
- Spectroscopy measurements.
- SEM and EDX trained.

9th Feb 2015 - 8th Mar 2016

Granted with Post-Doc Fellowship at CNR-IMM

1st Oct 2012 - 31st Jan 2015

Granted with Marie Curie Fellowship (ESR -European NetFiSiC project) at CNR-IMM

CNR - Istituto per la Microelettronica e Microsistemi (IMM) - Strada VIII n.5, Zona Industriale I95121 Catania - ITALY(marilena.vivona@imm.cnr.it)

Micro/Nano Electronics domain

Experimental investigation on advanced Silicon Carbide (SiC) devices for high Power Electronics applications. Electrical, morphological and structural characterizations of MOS capacitors, Ohmic and Schottky contacts.

Skills

- Atomic Force Microscopy applying various configurations (AFM, C-AFM).
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**ADDITIONAL SCIENTIFIC
ACTIVITY**

18 th March 2022	Doctoral Dissertation comitee member Marine Aubry, <i>Coupled experimental and theoretical study of combined radiation and temperature effects on fiber-based amplifiers</i> , PhD in Optics, Photonics and Hyperfrequencies, Université de Lyon - France
24 th October 2021	Tutorial Day of the ECSCRM 2020-2021 conference (24 – 28 October 2021 - Tours, France) 1990-2020: 30 YEARS OF SiC DEVICE DEVELOPMENT From technology to applications
March 2019	Trining for the use of SEM and combined EDX analysis facility
7 th - 18 th April 2016	Guidance on the safe use of lasers in education and reserach
4 th - 9 th October 2015	Member of the Local Organizing Comitee of the ICSCRM 2015 conference
4 th October 2015	Tutorial Day of the ICSCRM 2015 conference (4 th – 9 th October 2015 - Giardini Naxos, Italy) SiC materials and technology: from the past towards the future
10 th - 13 th November 2014	Visiting Researcher at the Friedrich-Alexander-University (FAU) of Erlangen-Nuremberg (Germany) Study on the electrical behavior of MOS capacitors by bias-temperature stress measurements.
21 st September 2014	Tutorial Day of the conference ECSCRM 2014 (21 st – 25 th September 2014 - Grenoble, France) Characterization methods applied to SiC: from material to devices.
25 th May 2014	Tutorial Day of the workshop ISiCPEAW 2014 (25 th – 27 th May 2014 - Stockholm, Sweden) Power electronics applications of silicon carbide technology.
28 th April 2014- 11 th May 2014	Visiting Researcher at the Friedrich-Alexander-University (FAU) of Erlangen-Nuremberg (Germany) Study on the electrical behavior of MOS capacitors by admittance spectroscopy.
29 th September 2013	Tutorial Day of the conference ICSCRM 2013 (29 th September – 4 th October 2013 - Miyazaki, Japan) Advanced materials for high power application
5 th July 2013	Visiting Researcher at the Université Claude Bernard - Lyon (France) Growth of epitaxial layer in SiC technology.
30 th Jan 2012-10 th Feb 2012	Campaigns at the Commissariat à l'énergie atomique et aux énergies alternatives (CEA) of Arpajon, Paris (France)
17 th - 28 th January 2011	
11 th - 22 th January 2010	On-line characterization of Yb/Er-doped optical fiber amplifiers under gamma-ray radiations.

Referee for International Journals

Reviewer

OSA publications (*Optics Letters, Applied Optics, Optical Materials Express, Optics Express, JOSA B*)

Trans. Tech. Publications INC (*Material Science Forum*)

IEEE Publications (*Transactions on Electron Devices*)

AIP Publications (*Journal of Applied Physics, Applied Physics Letters*)

MDPI (*Photonics, Applied Sciences, Electronics, Crystals, Electronic Material*)

ELSEVIER (*Applied Surface Science, Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, The European Physical Journal Plus, Solid-State Electronics, Materials Science in Semiconductor Processing*)

ACS Publications (*Applied Materials & Interfaces*)

Member of Editorial Board

"*Scanning*" (Hindawi and John Wiley & Sons Publishing Partnership)

- Impact Factor 1.932 - ISSN: 0161-0457 (Print); ISSN: 1932-8745 (Online)

Member of Editor Topic Team

"*Materials*" (MDPI) - Impact Factor 3.623 - ISSN: 1996-1944

EDUCATION

31st May 2021

National Scientific Qualification (Abilitazione Scientifica Nazionale, ASN)

"Associated" degree in the Italian academic recruitment system.

Call 2018/2020 (Ministerial Decree n. 2175/2018) for the disciplinary field of 02/B1 – Experimental Physics of Matter, according to the national classification.

The validity of the qualification is nine years, starting from 31/05/2021.

October 2009 - September 2012

PhD in Optics and Photonics

Issued in Partnership Program (cotutelle in French) between the Laboratoire Hubert Curien and the Physics Department of Palermo, under the supervision of Prof. Youcef Ouerdane and Prof. Marco Cannas.

- Laboratoire Hubert Curien - 18, Rue B. Lauras - F-42000 Saint-Etienne – France

- Dipartimento di Fisica, Università degli Studi di Palermo - via Archirafi, 36- I90123 Palermo – Italy

Thesis title: Radiation hardening of optical fiber amplifier - Thesis Dissertation July 4th 2013.

- Private subvention from the industry ixFiber SAS (Lannion, France).
- Awarded by the VINCI grant 2010 for the Mobility in PhD Thesis (Partnership Program): 4500 €.

Optics and Photonics domain

Experimental investigation on Er/Yb-doped fibres for high performance optical amplifiers designed for space applications. Spectroscopic characterization in the IR-Vis-UV domain. Study of the microscopic mechanisms responsible for performance degradation and evaluation of the hardening solutions (Ce-codoping and H₂-loading).

Skills

- Handling with optical fibre (stripping, cleaving, splicing and connection of optical fibres)
- Mechanical polishing and measurements of optical preforms.

- Stationary and time-resolved luminescence spectroscopy with various laser sources, continuous or pulsed, from UV to IR.
- Absorption and wavelength-dependent luminescence spectroscopy.
- Confocal microscopy: Raman and Luminescence.
- Active and passive characterizations under gamma-ray irradiation of optical fibres as part of an optical amplifier.

User of the Gamma-ray facility and Semiconductor X-ray irradiator at the *Commissariat à l'énergie atomique et aux énergies alternatives* (CEA) of Arpajon in Paris- FRANCE.

Attended courses during the PhD:

- Photonics at short and ultra-short times. Engineering of the laser pulses: from nanosecond to femto-second (Saint-Etienne, France, 2011).
- Introduction to the scanning electron microscopy and elemental micro-analysis applied to materials (Saint-Etienne, France, 2011).
- Surfaces functionalized by optical micro/nano-structurations (Saint-Etienne, France, 2012).

Academic years
1999/2000 - 2006/2007

Master degree in Physics

Dipartimento di Scienze Fisiche e Astronomiche, Università di Palermo - via Archirafi, 36 I-90123 Palermo – ITALY

Thesis title: *Effects of Gallium on the optical properties of SiO₂* (solid-state physics field) under the supervision of Prof. Marco Cannas. Evaluation: 106/110 (March 20th, 2008)

PERSONAL SKILLS

Mother tongue
Other language(s)

	Italian				
	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	B2	B2	C1
French	C1	C1	B2	B2	C1

Common European Framework of Reference for Languages: A1/A2: Basic User – B1/B2: Independent User – C1/C2: Proficient User

Driving Licence

B (Italian Licence)

Computer skills

- Operating System: Windows XP - 7 - 8.
- Office applications: Word, Excel, PowerPoint.
- Document Markup Language: Latex.
- Data Analysis: Sigmaplot, Origin, Peakfit.
- Programming Languages: Matlab, Mathematica.
- Graphics Software: CorelDraw, Gimp.
- Image Processing: ImageJ,
- Instruments software.
- Email and Internet.

REFERENCES ARE AVAILABLE ON REQUEST.

SCIENTIFIC PRODUCTION

SELECTED PAPERS

1. **Materials and Processes for Schottky Contacts on Silicon Carbide**
M. Vivona, F. Giannazzo and F. Roccaforte
Materials, vol.15 (2022) 298 – REVIEW paper
2. **Temperature and time dependent electron trapping in Al₂O₃ thin films onto AlGaN/GaN heterostructures**
P. Fiorenza, E. Schilirò, G. Greco, M. Vivona, M. Cannas, F. Giannazzo, R. Lo Nigro and F. Roccaforte
Applied Surface Science, vol. 579 (2022) 152136.
3. **Ni Schottky barrier on heavily doped phosphorus implanted 4H-SiC**
M. Vivona, G. Greco, M. Spera, P. Fiorenza, F. Giannazzo, A. La Magna and F. Roccaforte
Journal of Physics D: Applied Physics, vol.54 (2021) 445107.
4. **Electrical properties of inhomogeneous tungsten carbide Schottky barrier on 4H-SiC**
M. Vivona, G. Greco, G. Bellocchi, L. Zumbo, S. Di Franco, M. Saggio, S. Rascunà and F. Roccaforte
Journal of Physics D: Applied Physics, vol.54 (2021) 055101.
5. **Active dopant profiling and Ohmic contacts behavior in degenerate n-type implanted silicon carbide**
M. Spera, G. Greco, A. Severino, M. Vivona, P. Fiorenza, F. Giannazzo and F. Roccaforte
Applied Physics Letters, vol.117 (2020) 013502.
6. **Electrical and structural properties of surfaces and interfaces in Ti/Al/Ni Ohmic contacts to p-type implanted 4H-SiC**
M. Vivona, G. Greco, C. Bongiorno, R. Lo Nigro, S. Scalese and F. Roccaforte
Applied Surface Science, vol. 420 (2017) pp. 331-335.
7. **Effect of Germanium doping on electrical properties of n-type 4H-SiC homoepitaxial layers grown by chemical vapor deposition**
T. Sledziewski, M. Vivona, K. Alassaad, P. Kwasnicki, R. Arvinte, S. Beljakowa, H. B. Weber, F. Giannazzo, H. Peyre, V. Souliere, T. Chassagne, M. Zielinski, S. Juillaguet, G. Ferro, F. Roccaforte and M. Krieger
Journal of Applied Physics, vol. 120 (2016) pp. 205701 1-7.
8. **Near interface traps in SiO₂/4H-SiC metal-oxide-semiconductor field effect transistors monitored by temperature dependent gate current transient measurements**
P. Fiorenza, A. La Magna, M. Vivona and F. Roccaforte
Applied Physics Letters, vol. 109 (2016) pp. 012012 1-5.
9. **Electrical properties of SiO₂/SiC interfaces on 2°-off axis 4H-SiC epilayers**
M. Vivona, P. Fiorenza, T. Sledziewski, M. Krieger, T. Chassagne, M. Zielinski and F. Roccaforte
Applied Surface Science vol. 364 (2016) pp. 892-895.
10. **Ti/Al/W ohmic contacts to p-type implanted 4H-SiC**
M. Vivona, G. Greco, R. Lo Nigro, C. Bongiorno and F. Roccaforte
Journal of Applied Physics, vol. 118 (2015) pp. 035705 1-7.
11. **Thermal stability of the current transport mechanisms in Ni-based Ohmic contacts on n- and p-implanted 4H-SiC**
M. Vivona, G. Greco, F. Giannazzo, R. Lo Nigro, S. Rascunà, M. Saggio, F. Roccaforte
Semiconductor Science and Technology, vol. 29 (2014) pp. 075018 1-7.
12. **Recent advances on dielectrics technology for SiC and GaN power devices**
F. Roccaforte, P. Fiorenza, G. Greco, M. Vivona, R. Lo Nigro, F. Giannazzo, A. Patti and M. Saggio
Applied Surface Science, vol. 301 (2014) pp. 9-18.
13. **Comparative study of gate oxide in 4H-SiC lateral MOSFETs subjected to post-deposition-annealing in N₂O and POCl₃**
P. Fiorenza, L. K. Swanson, M. Vivona, F. Giannazzo, C. Bongiorno, A. Frazzetto and F. Roccaforte
Applied Physics A, vol.115 (2014) pp. 333-339.
14. **SiO₂/4H-SiC interface doping post-deposition annealing of the oxide in N₂O or POCl₃**
P. Fiorenza, F. Giannazzo, M. Vivona, A. La Magna and F. Roccaforte
Applied Physics Letters, vol. 103 (2013) pp. 153508 1-4.
15. **Design of Radiation-Hardened Rare-Earth Doped Amplifiers Through a Coupled Experiment/Simulation Approach**

- S. Girard, L. Mescia, **M. Vivona**, A. Laurent, Y. Ouerdane, C. Marcandella, F. Prudenzeno, A. Boukenter, T. Robin, P. Paillet, V. Goiffon, M. Gaillardin, B. Cadier, E. Pinsard, M. Cannas and R. Boscaino
Journal of Lightwave Technology, vol. 31 (2013) pp. 1247-1254.
16. **Radiation hardening techniques for Er/Yb doped optical fibers and amplifiers for space application**
S. Girard, **M. Vivona**, A. Laurent, B. Cadier, C. Marcandella, T. Robin, E. Pinsard, A. Boukenter and Y. Ouerdane
Optics Express, vol. 20 (2012) pp. 8457-8465.
17. **Influence of Ce³⁺- Codoping on the Photoluminescence Excitation Channels of Phosphosilicate Yb/Er-Doped Glasses**
M. Vivona, S. Girard, T. Robin, B. Cadier, L. Vacarro, M. Cannas, A. Boukenter, Y. Ouerdane
IEEE Photonics Technology Letters, vol. 24 (2012) pp. 509-511.
18. **Influence of Ce codoping and H₂ pre-loading on Er/Yb-doped fiber: Radiation response characterized by Confocal Micro-Luminescence**
M. Vivona, S. Girard, C. Marcandella, T. Robin, B. Cadier, M. Cannas, A. Boukenter and Y. Ouerdane
Journal of Non-Crystalline Solids, vol. 357 (2011) pp. 1963-1965.

CONFERENCES

Conferences: contribution as [presenting-author](#)

- 13th European Conference on Silicon Carbide and Related Materials (ECSCRM) 2020-2021 - (Hybrid Conference)
Virtual Participation – 24-28 October 2021
 - a) Electrical properties of Ni/heavily-doped 4H-SiC Schottky contacts
(**ORAL, first author**).
 - b) Current conduction mechanism in forward and reverse biased WC Schottky contact on 4H-SiC Electrical characterization of W-based Schottky barrier on 4H-SiC
(**POSTER, first author**).
- International Workshop on Silicon Carbide in Europe (SiCE) 2020 - (Virtual Conference)
Virtual Conference – 19 November 2020
Current conduction mechanism in forward and reverse biased WC Schottky contact on 4H-SiC (**ORAL, first author**).
- OSA Advanced Photonics Congress - Specialty Optical Fibers (SOF) Meeting 2018
Zurich (Switzerland) – 2-5 July 2018
Non-destructive microscopic characterization of optical fiber (**ORAL, first author**)
- 16th International Conference on Silicon Carbide and Related Materials (ICSCRM) 2015
Giardini-Naxos (Italy) – 4-9 October 2015
 - a) Processing and characterization of MOS capacitors fabricated on 2°-off axis 4H-SiC epilayers (**POSTER, first author**)
 - b) X-ray irradiation on 4H-SiC MOS capacitors processed under different annealing conditions (**POSTER, first author**).
- 10th European Conference on Silicon Carbide and Related Materials (ECSCRM) 2014
Grenoble (France) – 21-25 September 2014
 - a) Evolution of electrical and structural properties of Ti/Al/W contacts to p-type implanted 4H-SiC upon thermal annealing
(**ORAL, first author**)
 - b) Preliminary study on the effect of micrometric Ge-droplets on the characteristics of Ni/4H-SiC Schottky contacts
(**POSTER, first author**).
- 15th International Conference on Silicon Carbide and Related Materials (ICSCRM) 2013
Miyazaki (Japan) – 29 September - 4 October 2013
 - a) Temperature-dependence of the electrical characteristics in Ni₂Si Ohmic contacts on n- and p-type implanted 4H-SiC
(**POSTER, first author**)
 - b) Electrical characteristics of Schottky contacts on Ge-doped 4H-SiC (**POSTER, first author**).

7. **9th International Conference on Space Optics (ICSO) 2012**
Ajaccio (France) – 9-12 October 2012
Radiation hardening of Rare-Earth doped fiber amplifiers (ORAL, first author).
8. **32nd Journées Nationales d'optique guidée (JNOG) 2012**
Lyon (France) – 10-12 July 2012
Réponse aux radiations des fibres optiques phosphosilicates dopées aux terres rares : mécanismes de durcissement liés au codopage au Ce (ORAL, first author).
9. **9th Symposium “Advanced Dielectrics and Related Devices” (SiO₂) 2012**
Hyères (France) – 17-20 June 2012
Radiation responses of Yb/Er-doped phosphosilicate optical fibers: hardening mechanisms related to Ce-codoping (ORAL, first author).
10. **Journée de la Recherche 2012**
Saint-Etienne (France) – 14 June 2012
Durcissement aux radiations de fibres optiques dopées aux Terres Rares (POSTER, first author).
11. **2nd journées "Tenue des fibres optiques en Milieu Radiatif"**
Saint-Etienne (France) – 7-8 November 2011
Durcissement aux radiations des fibres optiques dopées aux Terres Rares pour applications spatiales (ORAL, first author).
12. **iXTech Meeting 2011**
Le Port Marly (France) – 22 September 2011
Durcissement aux radiations de fibres optiques dopées aux Terres Rares et d'amplificateurs à fibres optiques (POSTER, first author).
13. **Symposium of the Leadership in Fiber Laser Technology (LIFT) project - European Commission funded project 2008-2013**
Lannion (France) – 12 July 2011
Radiation hardening of Rare Earth doped fiber amplifiers: active and passive characterization (ORAL, first author).
14. **31st Journées Nationales d'optique guidée (JNOG) 2011**
Marseille (France) – 4-7 July 2011
Durcissement aux radiations de fibres optiques dopées Terres Rares et d'amplificateurs à fibres optiques (POSTER, first author).
15. **8th Symposium “Advanced Dielectrics and Related Devices” (SiO₂) 2010**
Varenna (Italy) – 21-23 June 2010
Influence of Ce co-doping and H₂ pre-loading on Er/Yb doped fiber: Radiation response characterized by Confocal Micro-Luminescence (POSTER, first author).

DATA

FIRMA

20/06/2022

