

Personal Details

Name and Surname: Vincenzo Caligiuri

Date of Birth: 14/06/1986

Nationality: Italian

Address: via F.lli Sprovieri, 13, 87100, Cosenza (CS), Italy.

Telephone: (+39) 3405876038

E-mail: vinc.caligiuri@gmail.com

Skype: vincenzo.caligiuri1

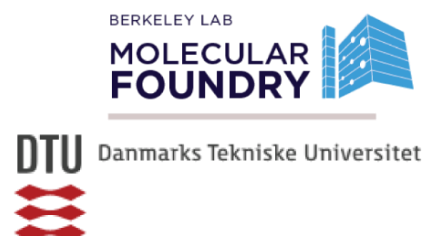
Education and Work Experience

09-10/2018 **Visiting Researcher** at the **Molecular Foundry (Lawrence Berkeley Laboratory, Berkeley, CA - USA)** under the Marie Skłodowska-Curie Grant Agreement COMPASS No. 691185 (PI Prof. Roman Krahne)

02/2017 **Post-Doc Researcher** in the Optoelectronics group of the Nanochemistry Department, at the **Italian Institute of Technology** (Ge, Italy). **Supervisors:** Prof. Roman Krahne and Prof. Liberato Manna.

11/2013 to 12/2016 – **Ph.D.**, at:

- “*Metamaterials and Light Scattering*” Laboratory, Dep. of Physics, **University of Calabria**.
- “*Nanoplasm*” Laboratory, Dep. Of Physics, **Case Western Reserve University** (Cleveland, OH, USA)
- Dept. of Micro- and Nanotechnology, **DTU Nanotech** (Copenhagen, Denmark).
- “*Beyond Nano*” Laboratory - **National Research Council (CNR)**, Italy.



Subject: “Gain-Plasmon Coupling toward nanolaser and full compensated, Hyperbolic Metamaterial based devices. **Supervisor:** Prof. Antonio De Luca.

09/2013 – **Post-Degree Internship**, at “Liquid Crystal Laboratory (LICRYL)”, Dep. of Physics, University of Calabria. **Supervisor:** Prof. Cesare Umeton.

05/2013 – **Master Degree in Electronic Engineering** (score 110/110), at DIMES (Dep. of Informatics, Modeling, Electronics and Systems), University of Calabria. Thesis: “Realization of two optofluidic active devices: pressure sensor and switchable, photonic-quasi crystal mode selector”. **Supervisor:** Prof. Cesare Umeton.

09/2010 – **Bachelor Degree in Electronic Engineering**, at DEIS (Dep. of Electronics, Informatics e Systems), University of Calabria. Thesis: “Optical Tunable Filter realized in soft composite liquid-crystalline material”. **Supervisor:** Prof. Cesare Umeton.

Grants and Projects

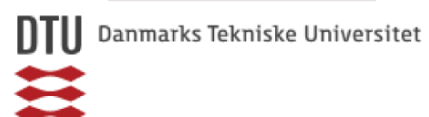
- “THERIS” (Tailored Metamaterials for Extremely high-Resolution Imaging and Sensing) - ATTRACT (H2020 Research and Innovation Programme under Grant Agreement No 777222) – Funded amount: 100.000 € - **Co-PI and Key Personnel**.

Books

- “New Directions in Thin-Film Nanophotonics”, Springer Nature, K. V. Sreekanth, M. Elkabbash, V. Caligiuri, R. Singh, A. De Luca, G. Strangi - **Co-Author and Co-Editor**. (In press).

Invited Contributions

- **V. Caligiuri**, M. Palei, M. Imran, L. Manna and R. Krahné, “A semi-classical view on Epsilon-Near-Zero Resonant Tunneling modes in Metal/Dielectric nanostructures”, Meta 2019, July 2019, Lisbon (Portugal), **Invited Oral Presentation**



Publications

- (1) Caligiuri, V.; Palei, M.; Biffi, G.; Artyukhin, S.; Krahné, R. *Nano Lett.* **2019**, *19* (5), 3151–3160.
- (2) Caligiuri, V.; Palei, M.; Biffi, G.; Krahné, R. *Nanophotonics* **2019**, 1–8.
- (3) Garoli, D.; Calandrini, E.; Giovannini, G.; Hubarevich, A.; Caligiuri, V.; De Angelis, F. *Nanoscale Horiz.* **2019**.
- (4) Imran, M.; Caligiuri, V.; Wang, M.; Goldoni, L.; Prato, M.; Krahné, R.; De Trizio, L.; Manna, L. *J. Am. Chem. Soc.* **2018**, *140* (7), 2656–2664.
- (5) Dhama, R.; Caligiuri, V.; Petti, L.; Rashed, A. R.; Rippa, M.; Lento, R.; Termine, R.; Caglayan, H.; De Luca, A. *ACS Nano* **2018**, *12* (1), 504–512.
- (6) Caligiuri, V.; Lento, R.; Ricciardi, L.; Termine, R.; La Deda, M.; Siprova, S.; Golemme, A.; De Luca, A. *Adv. Opt. Mater.* **2018**, *6* (5), 1–8.
- (7) Caligiuri, V.; Palei, M.; Imran, M.; Manna, L.; Krahné, R. *ACS Photonics* **2018**, *5* (6), 2287–2294.
- (8) Palei, M.; Caligiuri, V.; Kudera, S.; Krahné, R. *ACS Appl. Mater. Interfaces* **2018**, *10* (26), 22356–22362.
- (9) Shamsi, J.; Rastogi, P.; Caligiuri, V.; Abdelhady, A. L.; Spirito, D.; Manna, L.; Krahné, R. *ACS Nano* **2017**, *11* (10), 10206–10213.
- (10) Caligiuri, V.; Pezzi, L.; Veltri, A.; De Luca, A. *ACS Nano* **2017**, *11*, 1012–1025.
- (11) Dhama, R.; Rashed, A. R.; Caligiuri, V.; El. Kabbash, M.; Strangi, G.; De Luca, A. *Opt. Express* **2016**, *24* (13), 14632.
- (12) Caligiuri, V.; Dhama, R.; Sreekanth, K. V.; Strangi, G.; De Luca, A. *Sci. Rep.* **2016**, *6*, 20002.
- (13) Caligiuri, V.; De Luca, A. *J. Phys. D Appl. Phys.* **2016**, *49*, 08LT01.
- (14) De Sio, L.; Caligiuri, V.; Umeton, C. *J. Opt.* **2014**, *16* (6).
- (15) Caligiuri, V.; De Sio, L.; Petti, L.; Capasso, R.; Rippa, M.; Maglione, M. G.; Tabiryan, N.; Umeton, C. *Adv. Opt. Mater.* **2014**, *2* (10), 950–955.
- (16) De Sio, L.; Palermo, G.; Caligiuri, V.; Vasdekis, A. E.; Pane, A.; Choi, J.-W.; Maffli, L.; Niklaus, M.; Shea, H. R.; Umeton, C. *J. Mater. Chem. C* **2013**, *1*, 7798–7802.

Conferences and Meetings

- **V. Caligiuri**, M. Palei, G. Biffi, M. Imran, S. Artyukhin, L. Manna and R. Krahne, “*A Semi-Classical view on the Occurrence and Hybridization of Resonant Tunneling Epsilon-Near-Zero Modes in Metal/Insulator Nanocavities*”, PLASMONICA 2019, June 2019, Napoli (Italy), **Oral Presentation**
- **V. Caligiuri**, M. Palei, G. Biffi, M. Imran, S. Artyukhin, L. Manna and R. Krahne, “*A semi-classical description of Epsilon-Near-Zero resonances in Metal/Insulator nano-cavities*”, TERAMETANANO 2019, May 2019, Lecce (Italy), **Oral Presentation**
- **V. Caligiuri**, M. Palei, M. Imran, L. Manna and R. Krahne, “*Double-Epsilon-Near-Zero and Resonant Gain Metal/Dielectric Multilayers*”, META 2018, June 2018, Marseille (France), **Oral Presentation**
- **V. Caligiuri**, R. Dhama, K. V. Sreekanth, R. Lento, L. Pezzi, L. Ricciardi, G. Strangi and A. De Luca, “*Dielectric Singularities in Hyperbolic Metamaterials*”, NANOPLASM 2016 Conference, June 2016, Cetraro (CS, Italy), **Oral Presentation.**
- **V. Caligiuri**, R. Dhama, K. V. Sreekanth, G. Strangi and A. De Luca, “*Dielectric Singularities in Hyperbolic Metamaterials*”, METAMATERIALS 2015 Conference, September 2015, Oxford (UK), **Oral Presentation.**
- L. De Sio, **V. Caligiuri** and C. Umeton, “*Tunable broadband optical filter based on soft-composite materials*”, COST Action Meeting, September 2014, Prague, **Poster Presentation.**
- K. V. Sreekanth, A. De Luca, **V. Caligiuri**, R. Dhama and G. Strangi, “*Experimental demonstration of SPPs and BPPs in hyperbolic metamaterials via hypergrating coupling technique*”, NANOPLASM Conference, June 2014, Cetraro (CS), **Poster Presentation.**
- **V. Caligiuri**, L. De Sio, L. Petti, R. Capasso, M. Rippa, M. G. Maglione, N. Tabiryan and C. Umeton, “*Molding the flow of light in Gold Photonic-Quasicrystals*”, COST Action Meeting, March 2014, Lisbona. **Oral Presentation.**
- **V. Caligiuri**, L. De Sio, G. Palermo, A. Pane, and C. Umeton. “*Photonic Devices based on Anisotropic Fluids*”, COST Action, 3-4 October 2013, Madrid. **Oral presentation.**
- **V. Caligiuri**, L. De Sio, G. Palermo, A. Pane and C. Umeton. “*Electro and pressure tunable cholesteric liquid crystal devices based on ion-implanted flexible substrates*”, NOMA Conference, June 2013, Cetraro (CS). **Poster presentation.**
- **V. Caligiuri**, L. De Sio and C. Umeton. “*Photonic Devices based on Anisotropic Fluids*”, EOSOF Conference, May 2013, Munich. **Oral presentation.**

- **V. Caligiuri**, L. De Sio and C. Umeton, “*Photonic Bandgap behaviour of a 2D periodic structure realized in soft composite materials*”. SICL Conference, June 2010, Cetraro (CS) **Poster presentation.**

Summer Schools and Workshops

- ESEM Summer School of Bioengineering, July 2010, Trinity College and Royal College of Surgeons, Dublin.
- COMSOL Multiphysics Workshop, October 2014, COMSOL Italia, Brescia, Italy.

Didactic Experience

- Physics I (Natural Sciences Dept.) – additional course, 10-12/2015
- Optoelectronics (Department of Informatics, Modeling, Electronics and Systems, 3-7/2016)

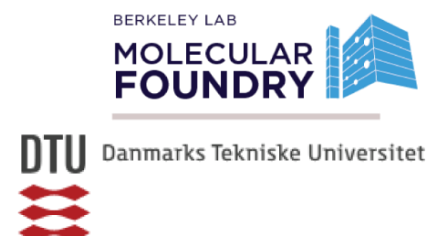
English Language Certifications

- First Certificate in English (FCE), B2 Level.
- Preliminary English Test (PET), B1 Level.

Skills and Expertises

Experimental Expertises:

- **Ellipsometry:**



The experience with this technique include the investigation and modeling of the refractive index, depolarization, polarized reflectance, transmittance and absorbance, pseudo-epsilon and Brewster angle conducted over a plethora of very complex systems, including (but not limited to) *hyperbolic metamaterials, multi-epsilon near zero plasmonic multilayers, epsilon near zero and pole metamaterials, perovskite nanocrystals, dot-in-dot and dot-in-rod colloidal quantum dot nanocrystals, organo-dielectric gain embedded blends and graphene doped polymers.*

- **Optical setup configuration:**

Realization and optimization of pump-probe setups for the investigation of plasmon-exciton coupling dynamics, photoluminescence, amplified spontaneous emission, lasing and spectroscopy by means of both continuous and femtosecond pulsed laser and tunable parametric amplifiers.

Realization and configuration of guided geometry optical setups, for the investigation of the light extraction properties induced by liquid-crystal coupled quasi-periodic systems.

- **Fluorescence Spectroscopy:**

Time Correlated Single Photon Counting (TCSPC) based measure of lifetime and decay rates and *Quantum Yield* of complex metal/halide perovskites, quantum-dots and organic dyes in solution and thin film configuration. Such measures have been extensively used also to characterize the plasmon/exciton coupling (FRET and weak coupling regime) taking place in complex plasmonic systems, from multi-shell metal/dielectric nanoparticles to double epsilon near zero subwavelength metal/dielectric plasmonic cavities. The measures reported here have been carried out either by means of classic spectrofluorimeter (Edinburgh Instruments) and by means of sophisticated femtosecond pulsed laser coupled *Streak Camera* systems.

- **Confocal Microscopy:**

Transmission, Reflection and Collection confocal investigations of the light propagation in periodic and quasi-periodic plasmonic meta-surfaces and hyperbolic metamaterials, also to confirm a new and extreme propagation regime called *Epsilon Near Zero and Pole*, in which he demonstrated the propagation of optical solitons reaching amazing confinement in a few tens of nanometers, perfect-lensing and ultra-subwavelength very high resolution imaging.

- **Polarized Optical Microscopy:**

Analysis of Liquid Crystal alignment and their refractive index switching under electro/optical stimulation, conducted via classic polarized microscopy analysis and conoscopical analysis.

- **Spin Coating Realization of Optoelectronic Devices:**



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- **Scanning Electron Microscopy (SEM):**
Analysis of the morphological properties of inorganic colloidal nanocrystals (CsPbBr₃ perovskite, CdSe/CdS, CdSe/ZnS core/shell quantum dots) metal and oxide thin films and cross sectional analysis of multilayered metamaterials.
- **Scanning Near Optical Microscopy (SNOM):**
Analysis of the near field distribution in complex plasmonic nano-structures (nano-antenna, nano-disks, nano-cylinders...), evaluation of the plasmonic field coupling, hot spots and hyperbolic metamaterials induced super-resolution.
- **Atomic Force Microscopy (AFM):**
Morphological analysis of metal and oxide thin layers, as well as of complex blends made of polymer (PVP), high-index oxide (TiO₂) and organic dye (Coumarin C522).
- **Physical Vapor Deposition techniques:**
Electron Beam deposition, Sputtering and Thermal deposition of metal and oxide thin films and nano-metric metal/dielectric stacked metamaterials.
- **Chemical Vapor Deposition techniques:**
Atomic Layer Deposition

Yusef Ali



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Nanoplasm Laboratory
Optics and Plasmonics of Soft Condensed Matter

BERKELEY LAB
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