

JACOPO PEDRINI

Researcher in semiconductor spectroscopy
Dipartimento di Scienza dei Materiali
Università degli Studi di Milano-Bicocca

ORCID: 0000-0001-7312-3667
Scopus: 56607138000

Short Bio

I am a materials scientist and university researcher with a strong experimental background in optical spectroscopy, semiconductors, and nanostructured materials. My work focuses on the optical properties of group-IV and III-V semiconductor systems, where I combine advanced spectroscopic techniques with modeling and device-oriented research. I have designed and led complex experiments involving photoluminescence (continuous-wave and time-resolved), Raman spectroscopy, and single-photon detection. I have also performed computational modeling and photonic bandstructure calculations of structured semiconductors. My research spans topics such as light-matter interaction, quantum photonics, and photovoltaics. I have also been actively involved in academic teaching, student supervision, and international collaborations.

Academic Positions

2025-current | Tenure Track Researcher (RTT) - Università degli Studi di Milano-Bicocca

- Working on optical spectroscopy of semiconductors with focus on quantum emitters, materials for multijunction photovoltaics, and photonic crystals.
- Assisting graduate and postgraduate students.

2025 | Research collaborator - PI: Prof. Fabio Pezzoli, Università di Milano-Bicocca

- Worked on the investigation of spin-dependent properties of group-IV semiconductors.
- Worked on the exploitation of defects in group-IV and III-V semiconductors for quantum technologies.
- Designed experimental setups for cryogenic micro-PL, time-resolved PL spectroscopy, and single photon detection.

2022-2024 | Assistant Professor (RTDA) - PI: Prof. Fabio Pezzoli, Università di Milano-Bicocca

- Lead research on optical characterization of III-V and group-IV alloys for high-efficiency multijunction photovoltaics and optoelectronic applications.
- Worked on the exploitation of topological photonic properties in group-IV semiconductors with the ultimate goal of fabricating a CMOS compatible group-IV laser.
- Worked on the exploitation of defects in group-IV and III-V semiconductors for frontier applications such as spintronics and quantum technologies.
- Worked on the generation of point defects in group-IV semiconductors through light ion irradiation.
- Worked on the characterization of long-wavelength emitting colloidal quantum dots, with possible applications in quantum technologies.
- Designed experimental setups for cryogenic micro-PL, time-resolved PL spectroscopy, and single photon detection.
- Contributed to national ("CANVAS") and EU ("MIRAQLS") research projects, coordinated lab activities.
- Assisted numerous graduate and postgraduate students.

2019-2021 | Postdoctoral Researcher (A2) - PI: Prof. Emiliano Bonera, Università di Milano-Bicocca

- Performed optical characterization (Raman, PL) to assess the optical quality and defectivity of heteroepitaxial group-IV microcrystals.
- Investigated the light-matter interaction and photonic properties of group-IV heterostructures through FDTD and FEM simulations.
- Applied various optical spectroscopy techniques (Raman, PL, micro-PL, time-resolved PL, spin-resolved PL, absorption, reflection, FT-IR, photocurrent) to the characterization of several different group-IV heterostructures with target applications to i) photovoltaics, ii) spintronics, iii) photonics.
- Assisted several graduate students.

2018-2019 | Postdoctoral Researcher (B) - PI: Prof. Emiliano Bonera, Università di Milano-Bicocca

- Worked on the EU-FET project "microSPIRE" aimed at the development of mid-infrared single photon detectors.
- Performed optical characterization (Raman, PL) to assess the optical quality and defect presence in heteroepitaxial group-IV microcrystals.

2017-2018 | Postdoctoral Researcher (B) - PI: Prof. Prof. Angelo Monguzzi, Università di Milano-Bicocca

- Worked on up-conversion photophysics in nanostructured organic systems with two specific application targets: i) below-bandgap photon recovery in solar cells; ii) low-autofluorescence systems for biological imaging and drug delivery.
-

Qualifications

2023: National Scientific Qualification ("Abilitazione Scientifica Nazionale") for the role of Associate professor ("professore di seconda fascia") in the sector 02/B1 – Experimental Physics of Matter (now 02/PHYS-03). The qualification is valid from 06/02/2023 to 06/02/2035.

Education

2014-2016 | Ph.D. in Materials Science and Nanotechnology - Università di Milano-Bicocca

Dissertation: "*Advanced Strategies for Light Management in Photonics, Imaging, and Sensing*"

Supervisor: Prof. Francesco Meinardi

2015-2016 | Visiting Ph.D. Scholar (Affiliate) - Molecular Foundry, Lawrence Berkeley National Lab, USA

Project: "*Fabrication of transition metal dichalcogenide photonic crystals*"

Supervisor: Dr. Adam M. Schwartzberg

2010-2013 | M.Sc. in Materials Science. 110/110 cum laude - Università di Milano-Bicocca

Supervisor: Prof. Francesco Meinardi

2007-2010 | B.Sc. in Materials Science. 110/110 cum laude - Università di Milano-Bicocca

Supervisor: Prof. Francesco Meinardi

Technical Skills

Optical Spectroscopy: Photoluminescence (continuous-wave, time-resolved, time-correlated single-photon counting, micro-PL), Raman, absorption, reflection, FT-IR, photocurrent;

Microscopy: Bright-field, confocal, fluorescence, scanning electron microscopy, atomic force microscopy;

Cryogenic Systems: closed- and open-circuit cryostats, liquid nitrogen operation;

Fabrication & Characterization: Atomic layer deposition, reactive ion etching, thermal processing, ellipsometry, profilometry, ion irradiation;

Modeling: Finite element method (COMSOL Multiphysics) and Finite-difference time-domain (Lumerical) for the calculation of photonic bandstructures.

Research Activities

Group-IV semiconductor heterostructures

Currently, my major research interest focuses on group-IV heterostructures, in particular on the understanding and engineering of light-matter interaction in epitaxially grown SiGeSn alloys. These alloys offer CMOS compatibility and tunable optical properties, making them highly attractive for the development of integrated photonic and quantum devices. My approach is their investigation by means of advanced optical spectroscopy techniques, with particular attention to the role of defects, quantum confinement, and spin-dependent effects. My research aims to unlock novel functionalities in spin-photon coupling, single-photon emission, and infrared optoelectronics, positioning group-IV platforms as key enablers of next-generation photonic technologies.

Moreover, my assistant professorship (RTDA) was performed in the context of a project named "*Development of innovative Si-Ge-Sn alloys for the efficient production of renewable energy*", funded by the Italian government in the "National Operative Plan – Research and Innovation" based on FSE-REACT-EU funds. The goal of the project was the development of binary and ternary SiGeSn alloys and the characterization of their optoelectronic properties, with the ultimate, but not only, goal of applying them into high-efficiency multijunction photovoltaic cells. The project was performed in collaboration with RSE SpA, an Italian company with strong experience in the development of photovoltaic systems.

III-V semiconductors for multijunction photovoltaics

My expertise on group-IV heterostructures can be extended towards other materials, such as III-V semiconductors. I am currently working within the project "CANVAS" funded by the Italian ministry for the ecological transition and aimed at the development of high efficiency solar cells for building integrated photovoltaics. The work package I am working on is focused on the development of metamorphic buffer layers

based on III-V semiconductors-on-Ge heterostructures. The ultimate goal of the work is the development of high-efficiency, low threading dislocation density, active buffer layers for multijunction photovoltaic cells. During this project I am collaborating with two Italian companies with outstanding experience in the fabrication and structural characterization of photovoltaic cells, RSE S.p.A. and CESI. My contribution is targeted at the characterization of the optical properties of metamorphic buffer layers and on the identification of strain relaxation mechanisms through optical techniques such as Raman spectroscopy, continuous-wave, and time-resolved photoluminescence.

Defect Engineering in Semiconductors for Quantum Technologies

I have worked on the project “MIRAQLS”, an international scientific collaboration between the EU and Canada with the goal of advancing novel quantum technologies. The project is co-funded by the EU’s Quantum Flagship and Canada’s Natural Sciences and Engineering Research Council. The goal of the work package I am working on is the generation of single photon sources in semiconductors to be used as emitters for quantum sensing. This goal is pursued in three ways: i) by generating point defects into semiconductors such as Si and isotopically purified Ge through irradiation with H⁺ and He²⁺ ions, ii) by direct inclusion of Fe ions into GaAs during MBE growth, and iii) by using colloidal quantum dots emitting in the near- and mid-infrared.

Photonic crystals and topological photonics

During my PhD I spent one year at the Molecular Foundry in Lawrence Berkeley National Laboratory (Berkeley, USA) working on a project aimed at the development of photonic crystals based on transition metal dichalcogenides, particularly WS₂. Such materials are known for their exceptional properties at the nanoscale, but they also possess a notable refractive index and are therefore ideal for photonics. Following this topic, during my work in the “microSPIRE” project I have characterized the photonic properties of periodically patterned group-IV homo- and hetero-epitaxial microcrystals. The goal of this work was to understand their antireflective properties and the emergence of a photonic bandgap that could be exploited for light absorption, light-routing and increasing of emission efficiency.

I then started working on topological photonics, i.e., the application of topological properties of matter to synthetic photonic structures. In this context I have performed mostly computational analyses of the topological properties of group-IV heterostructures. Currently, I am working on the exploitation of topological photonic systems with the ultimate goal of fabricating a CMOS compatible GeSn topological laser. For this project, the computational side has been paired with device fabrication and characterization.

Collaborations

Active

- The CANVAS consortium: Dr. Nicola Armani (RSE SpA), Dr. Gianluca Timò (RSE SpA), Dr. Roberta Campesato (CESI SpA), National Research Council. Development of high quality III-V on Ge metamorphic buffer layers for high efficiency multijunction solar cells.
- RSE SpA: Development of SiGeSn alloys as active layers for multijunction photovoltaics.
- The MIRAQLS consortium: Prof. Oussama Moutanabbir (Polytechnique of Montreal), Prof. Valentino Rigato (INFN), Prof. Stefano Sanguinetti (Università degli Studi di Milano-Bicocca). Development of infrared-emitting single photon sources in semiconductor by generating point defects i) with high energy ion irradiation in Si and Ge or ii) by including impurities during MBE growth.
- Prof. Loredana Protesescu (University of Groningen, The Netherlands). Characterization of near- and mid-infrared-emitting colloidal quantum dots.
- Prof. Donguk Nam (Nanyang Technological University, Singapore). Development of group-IV based topological photonic crystal lasers.
- Dr. Daniel Schwartz (Universität Stuttgart). Optical characterization of MBE-grown SiGeSn thin films for applications to photovoltaic and optoelectronic devices.
- Prof. Michele Virgilio (University of Pisa) and Giordano Scappucci (TU Delft). Study of the spintronic properties of Si and SiGe alloys.
- Prof. Giovanni Isella (L-NESS and Politecnico di Milano), Dr. Enrico Talamas Simola (Università degli Studi Roma Tre), prof. Emilio Scalise (Università degli Studi di Milano-Bicocca). Investigation of spintronic properties of extended defects in group-IV heterostructures.
- Prof. Giovanni Isella (L-NESS and Politecnico di Milano), prof. Ross Millar (University of Glasgow). Investigation of the strain relaxation in patterned Ge-on-Si mesas for the fabrication of single photon detectors.

Past

- Dr. Adam M. Schwartzberg and Dr. Stefano Cabrini (The Molecular Foundry, LBNL): Development of WS₂ based photonic crystals.
 - The microSPIRE consortium; prof. Giovanni Isella (L-NESS and Politecnico di Milano), prof. Stefano Sanguinetti (Università degli Studi di Milano-Bicocca), prof. Francesco Montalenti (Università degli Studi di Milano-Bicocca), Prof. Douglas J. Paul (University of Glasgow), prof. Kerstin Voltz (Philipps-Universität Marburg). Development of mid-infrared single photon detectors via self-assembled heteroepitaxial microcrystals.
 - Evatec GmbH: optical characterization of n-type GaN thin films deposited by sputtering.
 - Prof. Sergio Brovelli (Università degli Studi di Milano-Bicocca), Prof. Victor I. Klimov (Los Alamos National Laboratory), prof. Liberato Manna (IIT), Prof. Guglielmo Lanzani (IIT), Policlinico di Milano. Several collaborations aimed at the application of colloidal quantum dots to sensing and biological imaging.
 - Prof Ingo Klimant (TU Graz), ENI S.p.A., prof. Michel Frigoli (Université de Versailles), prof. Luca Beverina (Università degli Studi di Milano-Bicocca), prof. Angiolina Comotti (Università degli Studi di Milano-Bicocca), Policlinico di Milano. Several collaborations aimed at the application of triplet-triplet annihilation-based photon up-conversion to photovoltaics, photocatalysis, biological imaging, and drug delivery.
-

National and international experiences

2022-2026:

- semiconductor irradiation with H⁺ and He²⁺ ions for the generation of point defects at the AN-2000 linear particle accelerator of the INFN in Legnaro (Padova, IT) - **several non-consecutive days**.

2015-2016:

- secondment at the Molecular Foundry at LBNL (Berkeley, USA), fabrication and characterization of WS₂-based photonic crystals - **11 months**;
- sample preparation at the Joint center for artificial photosynthesis at LBNL (Berkeley, USA) - **several non-consecutive days**;
- sample characterization at the Advanced Light Source at LBNL (Berkeley, USA) - **several non-consecutive days**.

2015:

- Training on single-photon spectroscopy measurements at LENS – Laboratorio Europeo di spettroscopia non-lineare (Firenze, IT) – **3 days**.
-

Projects

As a PI

2026

I am the principal investigator of the project *GENESIS: Germanium-based Novel single-photon Emitters for quantum photonicS using ion implantation and Isotopic control*, aimed at the fabrication of color centers in Ge through light ion irradiation. The project grants access for a total of 5 days to the AN-2000 linear accelerator hosted in the INFN laboratory of Legnaro.

2025

- **FAQC 2025: GELATO** (Germanium-based lasing in topological architectures for integrated photonics). 25k€. Development of a GeSn topological laser for Si-based photonic circuits.
- **NFFA-DI: SPICY** (Silicon photonic cavities to increase C-centers emission yield). Access to nanofabrication facilities to develop photonic crystal cavities.

2015-2016

I submitted two user proposals to access the facilities of the Molecular Foundry, a materials-science focused user facility in Lawrence Berkeley National Laboratory in Berkeley (CA, USA):

- *Fabrication of transition metal dichalcogenide photonic crystals*;
- *Development of transition metal dichalcogenide photoelectrodes for up-conversion assisted photocatalytic water splitting*.

Both proposals were approved, granting access to the Molecular Foundry.

As a participant

2015-2025

I participated in several regional, national, and international research projects. The most important are, from most to less recent:

- MIRAQLS: EU-Canada collaborative project aimed at the development of mid-infrared quantum sensing technologies;
- CANVAS: Italian project aimed at the development of high-efficiency technologies for building-integrated photovoltaics;
- MICROSPIRE: EU-FET project aimed at the development of single photon detectors based on self-assembled heteroepitaxial microcrystals;
- TEINVEIN: Regione Lombardia funded project aimed at the development of single photon detectors for self-driving cars;
- USB: Project funded by the Fondazione Cariplo and aimed at the development of materials for triplet-triplet annihilation-based photon upconversion, with applications in solar technologies, biological imaging and theranostics.

Bibliometrics

I have authored **30** scientific papers published in international journals and conference proceedings. Among these, I am the first author or co-author with equal contribution in **9** papers ([**11**, **12**, **13**, **15**, **16**, **17**, **19**] and proceeding [**1**, **3**]). I am the corresponding author of **3** of these works ([**6**, **11**, **12**]) and the last author of **1** other paper [**5**]. Additionally, **1** of these papers was an invited review contribution [**17**]. Notably, **18** of such publications were achieved without the involvement of my PhD supervisor.

I have presented my research in **14** talks at international conferences and symposia. **4** of these presentations were invited. I also presented **5** posters in international conferences and events.

Citations: 680 (Scopus)

h-index: 12

Full List of Publications

Papers (from more to less recent)

1. *Optical spin pumping in Silicon*, S. Achilli, D. Marian, M. Lodari, E. Bonera, G. Scappucci, J. Pedrini, M. Virgilio, and F. Pezzoli, **Phys. Rev. Research**, in press (2026)
2. *Circular photogalvanic effect in large-area polycrystalline Tellurium thin films*, E. Bonaventura, C. Massetti, M. Gardella, S. Ghomi, C. Grazianetti, C. Martella, A. Molle, J. Pedrini, F. Pezzoli, and E. Bonera, **Physica Status Solidi (RRL) - Rapid Research Letters**, 20, e202500382 (2026)
3. *Formation of C-centers in Si-based systems by light ion irradiation*, C. Crosta, R. Nardin, P. Daoust, S. Achilli, I. Colombo, M. Campostrini, E. Bonera, J. Pedrini, O. Moutanabbir, V. Rigato, and F. Pezzoli, **arXiv:2510.12690** (2025)
4. *Step-Graded III-V Metamorphic Buffers on Ge for High-Efficiency Photovoltaics: investigation of strain relaxation and morphology evolution*, E. Achilli, N. Armani, J. Pedrini, E. Greco, S. Digrandi, A. Fratta, F. Pezzoli, R. Campesato, G. Timò, **Crystals**, 15, 900 (2025)
5. *Optical control of the spin-Hall effect in a two-dimensional hole gas*, S. Rossi, V. Caprotti, A. Filippi, E. Bonera, J. Pedrini, R. Raimondi, M. Myronov, and F. Pezzoli, **arXiv:2503.05583v1** (2025)
6. *Spin Pumping in Epitaxial Ge_{1-x}Sn_x Alloys*, E. Longo, O. Concepción, R. Mantovan, M. Fanciulli, M. Myronov, E. Bonera, J. Pedrini, D. Buca, and F. Pezzoli, **Adv. Quantum Technol.** 2400508 (2024)
7. *Effective Out-Of-Plane Thermal Conductivity of Silicene by Optothermal Raman Spectroscopy*, E. Bonaventura, D. S. Dhungana, C. Massetti, J. Pedrini, C. Grazianetti, C. Martella, F. Pezzoli, A. Molle, and E. Bonera, **Adv. Optical Mater.** 2401466 (2024)
8. *THz higher-order topological photonics in Ge-on-Si heterostructures*, I. Colombo, P. Minazzi, E. Bonera, F. Pezzoli, and J. Pedrini, **SciPost Phys. Core** 7, 039 (2024)
9. *3D finite-element modeling of topological photonics in germanium*, I. Colombo, J. Pedrini, E. Iemmolo, and F. Pezzoli, **Mat. Sci. in Semicond. Proc.** 180, 108539 (2024)
10. *Strain Relaxation of InAs Quantum Dots on Misoriented InAlAs(111) Metamorphic Substrates*, A. Tuktamyshev, S. Vichi, F. G. Cesura, A. Fedorov, G. Carminati, D. Lambardi, J. Pedrini, E. Vitiello, F. Pezzoli, S. Bietti, and S. Sanguinetti, **Nanomaterials** 12, 3571 (2022)

11. *Optical manipulation of the Rashba effect in germanium quantum wells*, S. Rossi, E. Talamas Simola, M. Raimondo, M. Acciarri, J. Pedrini, A. Balocchi, X. Marie, G. Isella, and F. Pezzoli, **Adv. Optical Mater.** 2201082 (2022)
12. *Conductive n-type gallium nitride thin films prepared by sputter deposition*, P. Loretz, T. Tcshirky, F. Isa, J. Patscheider, M. Trottmann, A. Wichser, J. Pedrini, E. Bonera, F. Pezzoli, and D. Jaeger, **J. Vac. Sci. Technol. A** 40, 042703 (2022)
13. *Bypassing the statistical limit of singlet generation in sensitized upconversion using fluorinated conjugated systems*, L. Vaghi, F. Rizzo, J. Pedrini, A. Mauri, F. Meinardi, U. Cosentino, C. Greco, A. Monguzzi, and A. Papagni, **Photochem. Photobiol. Sci.** (2022)
14. *Photonic bandgap and light routing in self-assembled lattices of epitaxial Ge/Si microstructures*, J. Pedrini, A. Barzaghi, J. Valente, D. J. Paul, G. Isella, and F. Pezzoli, **Phys. Rev. Applied** 16, 064024 (2021)
15. *Broadband Control of the Optical Properties of Semiconductors Through Site-Controlled Self-Assembly of Microcrystals*, J. Pedrini, P. Biagioni, A. Ballabio, A. Barzaghi, M. Bonzi, E. Bonera, G. Isella, and F. Pezzoli, **Opt. Express** 28, 17, 24981-24990 (2020)
16. *Engineering Porous Emitting Framework Nanoparticles with Integrated Sensitizers for Low-Power Photon Upconversion by Triplet Fusion*, J. Perego & J. Pedrini, C. X. Bezuidenhout, P. E. Sozzani, F. Meinardi, S. Bracco, A. Comotti, and A. Monguzzi, **Adv. Mater.** 1903309 (2019)
17. *Triplet-Triplet Annihilation Based Photon Up-Conversion in Hybrid Molecule-Semiconductor Nanocrystal Systems*, A. Ronchi, P. Brazzo, M. Sassi, L. Beverina, J. Pedrini, F. Meinardi, and A. Monguzzi, **Phys. Chem. Chem. Phys.** 21, 12353-12359 (2019)
18. *Very High Refractive Index Transition Metal Dichalcogenide Photonic Conformal Coatings by Conversion of ALD Metal Oxides*, C. T. Chen & J. Pedrini, E. A. Gauding, C. Kastl, G. Calafiore, S. Dhuey, T. R. Kuykendall, S. Cabrini, F. M. Toma, S. Aloni, and A. M. Schwartzberg, **Sci. Rep.** 9:2768 (2019)
19. *Cascade Sensitization of Triplet-Triplet Annihilation Based Photon Upconversion at Sub-Solar Irradiance*, J. Pedrini, A. Monguzzi, F. Meinardi, **Phys. Chem. Chem. Phys.** 20, 9745 – 9750 (2018)
20. *Recent Advances in the Application of Triplet-Triplet Annihilation-Based Photon Up-Conversion Systems to Solar Technologies*, J. Pedrini, and A. Monguzzi, **Journal of Photonics for Energy** 8(2), 022005 (2018)
21. *Role of Nonradiative Defects and Environmental Oxygen on Exciton Recombination Processes in CsPbBr₃ Perovskite Nanocrystals*, M. Lorenzon, L. Sortino, Q. Akkerman, S. Accornero, J. Pedrini, M. Prato, V. Pinchetti, F. Meinardi, L. Manna, and S. Brovelli, **Nano Lett.** 17 (6), pp 3844–3853 (2017)
22. *Two-Color Emitting Colloidal Nanocrystals as Single Particle Ratiometric Probes of Intracellular pH*, F. Bruni & J. Pedrini, C. Bossio, B. Santiago-Gonzalez, F. Meinardi, W. K. Bae, V. I. Klimov, G. Lanzani and S. Brovelli, **Adv. Funct. Mater.** 1605533 (2017)
23. *Self-Assembled Dual Dye-Doped Nanosized Micelles for High-Contrast Up-Conversion Bioimaging*, S. Mattiello, A. Monguzzi, J. Pedrini, M. Sassi, C. Villa, Y. Torrente, R. Marotta, F. Meinardi and L. Beverina, **Adv. Funct. Mater.** 26, 8447–8454 (2016)
24. *Permanent Excimer Superstructures by Supramolecular Networking of Metal Quantum Clusters*, B. Santiago-Gonzalez, A. Monguzzi, J. M. Azpiroz, M. Prato, S. Erratico, M. Campione, R. Lorenzi, J. Pedrini, C. Santambrogio, Y. Torrente, F. De Angelis, F. Meinardi and S. Brovelli, **Science** 353, 571-575 (2016)
25. *Unraveling Triplet Excitons Photophysics in Hyper-Cross-Linked Polymeric Nanoparticles: Toward the Next Generation of Solid-State Upconverting Materials*, A. Monguzzi, M. Mauri, M. Frigoli, J. Pedrini, R. Simonutti, C. Larpent, G. Vaccaro, M. Sassi, and F. Meinardi, **J. Phys. Chem. Lett.** 7, 2779–2785 (2016)
26. *Efficient Broadband Triplet-Triplet Annihilation-Assisted Photon Upconversion at Subsolar Irradiance in Fully Organic Systems*, A. Monguzzi, S. M. Borisov, J. Pedrini, I. Klimant, M. Salvalaggio, P. Biagini, F. Melchiorre, C. Lelii, and F. Meinardi, **Adv. Funct. Mater.** 25, 5617–5624 (2015)
27. *Reversed oxygen sensing using colloidal quantum wells towards highly emissive photoresponsive varnishes*, M. Lorenzon, S. Christodoulou, G. Vaccaro, J. Pedrini, F. Meinardi, I. Moreels and S. Brovelli. **Nat. Commun.** 6 (2015)

Conference proceedings (from more to less recent)

1. *Ge-based photonics for quantum technologies*, J. Pedrini, M. Cis, E. Talamas Simola, E. Bonera, G. Isella, and F. Pezzoli, **2024 IEEE Photonics Society Summer Topicals Meeting Series (SUM)** (2024)
2. *Electric-field induced modification of the photoluminescence polarization in Ge/Si_{0.15}Ge_{0.85} quantum wells*, S. Rossi, E. Talamas Simola, M. Raimondo, M. Acciarri, J. Pedrini, A. Balocchi, X. Marie, G. Isella, and F. Pezzoli, **Proceedings of SPIE** Vol. 12656 (2023)
3. *Light-matter interaction in self-assembled semiconductor microstructures*, J. Pedrini, and F. Pezzoli, **2022 IEEE Photonics Society Summer Topicals Meeting Series (SUM)** (2022)

Participation to International Conferences

Invited talks (from more to less recent)

1. *Photonic bandgap and light routing in self-assembled lattices of epitaxial Ge/Si microstructures*, J. Pedrini, A. Barzaghi, J. Valente, D. J. Paul, G. Isella, and F. Pezzoli, **OPTICSMEET2021** (Nice, France)
2. *Broadband control of the optical properties of semiconductors through site-controlled self-assembly of microcrystals*, J. Pedrini, P. Biagioni, A. Ballabio, A. Barzaghi, M. Bonzi, E. Bonera, G. Isella, and F. Pezzoli, **EMN Meeting on Photonics 2019** (Milan, Italy)
3. *An Overview on Triplet-Triplet Annihilation Based Photon Up-Conversion*, J. Pedrini, **The Molecular Foundry – invited seminar series Spring 2018** (Berkeley, USA)
4. *Fabrication and Characterization of WS₂ Based Photonic Structures*, J. Pedrini, G. Calafiore, C. Chen, C. Kastl, F. Meinardi, S. Cabrini, and A. M Schwartzberg, **SPIE Nanoscience+ Engineering 2016** (San Diego, USA)

Oral presentations (from more to less recent)

1. *Harnessing defects for spintronics in Ge heterostructures*, J. Pedrini, M. Cis, S. Rossi, E. Talamas Simola, E. Bonera, G. Isella, and F. Pezzoli, **E-MRS Spring Meeting 2025** (Strasbourg, France)
2. *Optical characterization of InGaAs/Ge metamorphic buffer layers for high-efficiency multijunction photovoltaic cells*, J. Pedrini, L. Mirabelli, E. Achilli, E. Greco, B. De Luca, S. Digrandi, M. Calicchio, P. Marzatico, G. Abagnale, G. Timò, M. Cornelli, R. Campesato, N. Armani, and F. Pezzoli, **E-MRS Fall Meeting 2024** (Warsaw, Poland)
3. *Polarized emission from extended defects in Ge heterostructures*, J. Pedrini, M. Cis, S. Rossi, E. Talamas Simola, E. Bonera, G. Isella, and F. Pezzoli, **E-MRS Fall Meeting 2024** (Warsaw, Poland)
4. *All-Optical Investigation of Spin Polarization in Si*, J. Pedrini, A. Eurosi, M. Crippa, M. Lodari, G. Scappucci, and F. Pezzoli, **E-MRS Fall Meeting 2023** (Warsaw, Poland)
5. *Photonic Properties of Self-Assembled Semiconductor Microstructures*, J. Pedrini, I. Colombo, P. Minazzi, A. Barzaghi, L. Miglio, G. Isella, and F. Pezzoli, **E-MRS Fall Meeting 2023** (Warsaw, Poland)
6. *Photonic Properties of Self-Assembled Semiconductor Microstructures*, J. Pedrini, I. Colombo, P. Minazzi, A. Barzaghi, L. Miglio, G. Isella, and F. Pezzoli, **ISTDM-ICSI 2023**, (Como, Italy)
7. J. Pedrini, J. Perego, C. Bezuidenhout, A. Ronchi, P. Sozzani, F. Meinardi, A. Comotti and A. Monguzzi, **MRS Spring Meeting 2018 (Phoenix, USA)**
8. *Triplet-Triplet Annihilation Based Photon Up-Conversion in Covalent Porous Aromatic Frameworks*, J. Pedrini, J. Perego, A. Comotti, P. Sozzani, F. Meinardi, and A. Monguzzi, *Triplet-triplet annihilation based photon up-conversion in covalent porous aromatic frameworks*, **ECME 2017 – 14th European Conference on Molecular Electronics (Dresden, Germany)**
9. *Fabrication and Characterization of WS₂ Based Photonic Structures*, J. Pedrini, G. Calafiore, C. Chen, C. Kastl, F. Meinardi, S. Cabrini, and A. M Schwartzberg, **E-MRS Fall Meeting 2016** (Warsaw, Poland)
10. *Broadband Sensitized Photon Up-Conversion at Subsolar Irradiance*, J. Pedrini, A. Monguzzi, and F. Meinardi, **SPIE Optics+ Photonics for Sustainable Energy 2016** (San Diego, USA)

Session chair

"Optoelectronic Materials and Devices II"
SPIE Optics+Photonics 2016 – Aug. 30, 2016 – San Diego (USA)

Teaching

PhD courses

- *Light-to-Electricity Devices, from Silicon Integration to Biological Frontiers* - Course for the PhD school in Materials Science and Nanotechnology – Università di Milano-Bicocca (4 hours – 0.5 CFU) [Academic Years 2024/2025; 2025/2026]
- *Photonic Crystals: Controlling Light with Structured Media* - Course for the PhD school "MIRQ – International School on Mid-Infrared Technologies for Quantum Sensing" – Como (1 hour, **invited talk**)

Courses @ Università di Milano-Bicocca

- *Laboratorio di Fisica dei Materiali* – B.Sc. Course in Materials Science (36 hours – 3 CFU) [A.Y. 2025/2026; 2024/2025; 2023/2024; 2022/2023]
- *Storia della fisica moderna e degli strumenti ottici* - B. Sc. Course in Optics and Optometry (36 hours - 3 CFU) [A.Y. 2023/2024]

- *Applied Physical Chemistry with Laboratory* - M. Sc. Course in Materials Science (36 hours - 3 CFU) [A.Y. 2022/2023]
 - *Physical characterization of materials with laboratory* - M.Sc. Course in Materials Science (36 hours - 3 CFU) [A.Y. 2021/2022]
-

Student Supervision

I have been the thesis supervisor (“relatore”) for **5** B.Sc. students for the degree in Materials Science and Physics. Additionally, I have been co-supervisor (“correlatore”) of **18** B.Sc. students and **6** M.Sc. students for the degrees in Physics and Materials Science. Both in the role of supervisor and co-supervisor, I closely followed students’ laboratory activities, particularly in their early thesis period to allow them to slowly gather independence, and supported their data analysis and thesis writing efforts. Among these students, **7** have decided to pursue a PhD, **4** of whom by continuing with their research in our group and **3** going abroad. I also have been co-supervisor for **1** Ph.D. student in the Materials Science and Nanotechnology Ph.D. course.

Editorial Activities

Associate editor:

Frontiers in Photonics, Optical Nanostructures section

Reviewer:

Thin solid films, *Nanomaterials*, *Materials*, *Electrical Engineering*, *Optics Express*

Patents

2014 – Patent application “*Composizione per l’up-conversion di fotoni*” - n° MI06235, ENI S.p. A. e Università degli Studi Milano-Bicocca - inventor. The patent describes a physical process to increase the efficiency of TTA-UC and is derived from publication [19].

Awards

2011 – “Miriam Ferrari” award for the best student of the B.Sc. Course in Materials Science – Università di Milano-Bicocca. The award was granted to the two top performing students in the B.Sc. Course for the academic year.

Institutional Responsibilities

I have managed the delivery, stocking, and consumption of the liquid nitrogen reservoir in the Department of Materials Science.

I took part in several open days for the Department of Materials Science and for the School of Sciences at the University of Milano-Bicocca.