

FRANCESCO CARULLI, PhD

Tenure-Track Researcher (RTT)

Department of Materials Science

University of Milano-Bicocca

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PROFESSIONAL PROFILE

I am a materials scientist working in the field of functional nanomaterials for photonic, optoelectronic and radiation-detection applications. My research activity has focused on the synthesis, engineering and characterization of semiconductor nanocrystals and hybrid nanocomposite materials, combining fundamental studies of their optical and electronic properties with the development of advanced materials for technological applications.

During my doctoral studies at the National Research Council (CNR-ISMAL), my research was primarily devoted to polymer-based functional materials and optoelectronic devices for solar energy conversion, with particular attention to materials scalability and industrial implementation. Subsequently, at the University of Milano-Bicocca, I expanded my research interests towards colloidal semiconductor nanocrystals, luminescent solar concentrators and nanostructured materials for photon management. More recently, my activity has focused on lead-halide perovskite nanocrystals and semiconductor quantum dots, investigating their photophysical properties and their integration into high-optical-quality polymer matrices for applications ranging from photonics and light-emitting devices to scintillation systems and radiation detection technologies.

My research combines materials synthesis, surface and interface engineering, optical spectroscopy and device-oriented materials development, within a multidisciplinary framework involving collaborations with national and international academic institutions, research centres and industrial partners.

CURRENT POSITION

2024 – Present

Tenure-Track Researcher (RTT)

University of Milano-Bicocca

Previous positions

2022 – 2024

Assistant Professor (RTDa)

University of Milano-Bicocca

2018 – 2022

Postdoctoral Research Fellow

University of Milano-Bicocca

2015 – 2018

Research Fellow

National Research Council – ISMAC, Milan

EDUCATION

2018 - PhD in Materials Science and Nanotechnology, University of Milano-Bicocca
Thesis: *Novel Materials for Solar Energy Conversion Devices: Towards Industrial Scaling-Up*

2014 - M.Sc. in Materials Science, University of Milano-Bicocca

SCIENTIFIC OUTPUT AND IMPACT

- Publications: 30+
- Citations: 3,112
- H-index: 20
- i10-index: 27
- Patents: 1 international patent family

Inventor of the patent family “*Colorless luminescent solar concentrator based on heavy-metal-free semiconductor nanocrystals*”, licensed for industrial exploitation and contributing to the creation of the spin-off company Glass to Power.

RESEARCH FUNDING AND PROJECTS

Principal Investigator / Scientific Coordinator

2025 - Recipient of the competitive University research grant **Quota Competitiva** (€25,000), University of Milano-Bicocca.

2023 – 2025 Principal Investigator of the INFN-funded project: *Engineering, prototyping and optical characterization of wavelength-shifting plates active in the VUV spectral region.*

2022 – 2024 Principal Investigator and Work Package Leader of the project: *Self-powered nanoscintillators for energy: integrable nuclear micro-batteries*, funded by the U4I Foundation.

Participation in Collaborative Projects

- Member of the Horizon Europe EIC Pathfinder project **UNICORN – Hybrid Nanocomposite Scintillators for Transformational Breakthroughs in Radiation Detection and Neutrino Research.**
- Member of **AIDAInnova – Advancement and Innovation for Detectors at Accelerators.**
- Member of the Regione Lombardia FESR project on innovative biomedical probes.
- Participant in industrial research projects funded by ENI.

TEACHING ACTIVITIES

2025 – Present: Co-lecturer, *Complementi di Struttura della Materia* (B.Sc. in Materials Science).

2025 – Present: Co-lecturer, *Visual Ergonomics* (M.Sc. in Optics and Optometry).

2020 – Present: Co-lecturer, *Laboratorio di Elettromagnetismo* (B.Sc. in Materials Science).

2022 – 2023: Laboratory instructor, *Physical Characterization of Materials* (M.Sc. in Materials Science).

SCIENTIFIC LEADERSHIP AND CONFERENCE ORGANIZATION

2024

- Co-Organizer Symposium S: *Semiconductor Nanostructures Towards Opto-Electronic and Photonic Device Applications – IX*, E-MRS Spring Meeting 2024, Strasbourg, France.
- Local Organizer, SCINT 2024, Milan, Italy.

2022

- Co-Organizer Symposium C: *Semiconductor Nanostructures Towards Opto-Electronic and Photonic Device Applications – VIII*, E-MRS Spring Meeting 2022, Strasbourg, France.

AWARDS AND RECOGNITION

2022 - Young Talent Award, University of Milano-Bicocca (3rd Prize), under the patronage of the Accademia Nazionale dei Lincei.

2015 - 2nd Prize, *Technology for Human Beings Award*, Prysmian Group.

EDITORIAL AND PEER-REVIEW ACTIVITIES

- Editorial Board Member, *Energies*.
- Reviewer for leading journals including *Advanced Materials*, *Nano Letters*, *ACS Nano*, *ACS Photonics*, *Advanced Optical Materials* and other ACS, Wiley, Elsevier, Springer and IOP journals.
- Reviewer for the Hong Kong Research Grant Council (NSFC/RGC Joint Research Scheme).