
CURRICULUM VITAE ET STUDIORUM

IRENE VILLA

Email 1: irene.villa@unimib.it

ORCID: [0000-0002-6150-7847](https://orcid.org/0000-0002-6150-7847)

• **EDUCATION AND KEY QUALIFICATIONS**

- 07-09-2015 Ph.D. in Materials Science and European Doctorate on Physics and Chemistry of Advanced Materials (PCAM), University of Milano-Bicocca (UniMiB)/ Italy *Structural and morphological tuning of inorganic luminescent nanophosphors: Towards applications in sensing and lighting.*

PhD Supervisor: Prof. Anna Vedda. Final assessment: Optimum

- 07-10-2008 M. Sc. Degree in Physics 110/110 magna cum laude, University of Milano/ Italy *Studio di luminescenza termicamente e otticamente stimolata in vetro musivo antico (Study of thermally and optically stimulated luminescence in ancient glass mosaic)*

- 28-02-2006 B. Sc. Degree in Physics 100/110, University of Milano /Italy *Analisi XRF in ceramiche antiche (XRF analysis of ancient ceramics)*

• **Current position(s)**

20-12-2022 -present Assistant Professor – Dept. of Materials Science/UniMiB/ Italy,
on project MINERVA (National Recovery and Resilience Plans (RRPs) CUP H25E22000490006)

• **Previous position(s)**

- 1/10/2020 – 30/09/22 MSCA Research Fellow - Institute of Physics AS CR, FZU, Prague/ Czechia
on project HANSOME (101003405- HANSOME - WF-02-2019)

- 01/01/2020 – 30/09/2020 Research Fellow – Dept. of Materials Science/ UniMiB/ Italy
Radioluminescence and scintillation mechanisms in composite materials for the detection of ionizing radiation based on fluorescent metal-organic frameworks (MOF) nanocrystals.

- 01/01/2016 – 31/12/2019 Research Fellow – Dept. of Materials Science/ UniMiB/ Italy *Scintillating Nano-oxides for Deep-Tissue Photodynamic Therapy*

- 01/01/2015 – 31/12/2015 “Della Riccia” Research Fellow in Materials Science - Universidad Autonoma de Madrid (UAM)/ Spain *Fluorescence Thermal Bioimaging based on Nanoparticle*

- 13/04/2013- 13/10/2013 Visiting PhD - UAM/ Spain

- 01/01/2012 – 31/12/2014 PhD student – Dept. of Materials Science/ UniMiB/ Italy

- 01/05/2009-31/12/2011 Junior Research Fellow – Dept. of Materials Science/ UniMiB/ Italy
Innovative archaeometric technologies for dating and characterization of archaeological materials

• **RESEARCH FUNDINGS**

(1) Principal Investigator of **LuMIminesceNt scintillating hEterostructures foR adVanced medical imAaging MINERVA – Funded by EU - NextGenerationEU** (RRPs) CUP H25E22000490006 (20/12/2022 - 20/12/2025). **(300 k€)** The project aims to develop advanced heterostructured scintillator with high luminescence efficiency and ultra-fast scintillation response for diagnostics by ToF-PET.

(2) Principal Investigator of **101003405- HANSOME, Hafnium oxide-based nanocomposite scintillators for fast timing detection**, Marie Skłodowska-Curie Action (01/10/2020 - 30/09/2022). **(145 k€)**. I led the project for the development of hafnium oxide nanoparticles based ultrafast composite scintillators for fast timing detection techniques.

• **REVIEWER ACTIVITIES AND COMMISSIONS OF TRUST**

I serve as Reviewer for peer-reviewed international journals: *Nat. Commun., Adv. Opt. Mater., Opt. Mater., Radiat. Meas., Dalton Trans., PSS basic solid-state physics*, and others. I am the guest editor at *IEEE Trans. Nucl. Sci.* journal. I work as Scientific Expert Committee Member for the evaluation of research projects in the context of the AAPG 2023 call for scientific group CE19 - Health Technologies (French National Research Agency). I am member of the organizing committee of the SCINT conference series, the most

relevant international forum on scintillator materials spanning from fundamental aspects to technological applications.

In 2019 I joined the Interdepartmental Center for Gender Studies - ABCD at UniMiB aiming at promoting and disseminating gender studies. In this framework, I was invited in 2019 to the workshop *Women in Science*. Currently, I am responsible of the ALIAS career program at the Dept. of Materials Science at UniMiB, a gender transition support program for students enrolled at the campus.

- **SUPERVISOR ACTIVITIES**

Since 2018, I supervised/co-supervised one doctoral theses and ten M.Sc. degree theses in Materials Science/ and Physics at UniMiB.

- **TEACHING ACTIVITIES**

Laboratory tutor for PHYSICS LABORATORY (50 hours/year) UniMiB/ Italy - M. Sc. Degree in Materials Science.

Lectures and laboratory tutor for COMPLEMENTS OF PHYSICS 1(20 hours/year) UniMiB/ Italy - M. Sc. Degree in Primary Education Science

National Plan for Science Degrees (PLS) launched by the Ministry of Education, Universities and Research (MIUR), (80 hours/year) UniMiB/ Italy

Laboratory lecturer for PHYSICS 2 UniMiB/ Italy - B. Sc. Degree in Materials Science

- **PERIODS ABROAD**

- In 2015, I joined the Fluorescence Imaging Group at UAM (Spain) as PI supported by “Angelo Della Riccia” Research Award promoting young researchers in scientific area abroad with a project on the infrared emission properties of fluoride nanocrystals for high-resolution medical imaging techniques and thermal therapy of oncological diseases.

- From 2016 to 2018 I worked on a monthly basis as a visiting researcher at FZU in Prague (Czechia) for H2020 ASCIMAT Project and at Lawrence Berkeley National Laboratory for H2020 INTELUM H2020 MSCA RISE Project. These projects promoted the development of scientific excellence in cutting-edge scintillator materials and the transfer of scientific know-how on dense inorganic scintillators for the production of new scintillators detectors.

- I was PI in the MSCA-WF HANSOME project (01-10-2020 - 30-09-2022) at the Czech Academy of Sciences ASCR, FZU in Prague, with collaboration with CERN in Geneva and NUVIA a.s. a leading Czechia company in scintillators manufacturing. The two-years project was dedicated to develop composite nanoscintillators for fast radiating detectors.

- **MAJOR COLLABORATIONS AND PROJECTS**

1) Dr. Etienne Auffray, CERN, Geneva, Switzerland and CCC crystal Clear Collaboration. Heterostructured multilayer scintillators for γ -rays detection in ultra-fast timing applications.

2) Dr. A.-L. Bulin, Université Grenoble-Alpes, France. Modeling of scintillation at the nanoscale

3) Prof. M. Nikl, FZU and NUVIA a.s. Company, Prague, Czechia. Scintillator for sensitive fast detectors for ToF-PET (MSCA-WF-HANSOME)

4) Prof. Y. Torrente, Hospital Maggiore-Policlinico in Milan, Italy. Biocompatible nanomaterials for fluorescence imaging techniques and cancer radiotherapies

5) Prof. C. Dujardin UCBL, France and Dr. Edith Bourret-Courchesne, Berkely National Labs, USA. Fast scintillators based on QD/perovskites, inorganic/hybrid materials (H2020 projects - ASCIMAT and INTELUM (RISE))

6) Dr. A. Lauria, Prof. M. Niederberger, ETH Zürich, Swiss. Metal oxide nanocrystals for photonic and scintillation applications

7) Prof. J. G. Solé, Prof. D. Jacque, UAM Spain. Bio-probes for in vitro/in vivo imaging techniques (Angelo della Riccia Fellowship)

8) Prof. L. Gironi, University of Milano-Bicocca Department of Physics, Italy. Next-generation scintillator based on QDs for detection of rare events (INFN-funded ESQUIRE Project)

9) Dr. A. Belén Davila-Ibañez, FIDIS, Santiago de Compostela, Spain. Multifunctional agents for in situ photodynamic treatment of advanced ovarian cancer (Proposal NANOTECMEC 2023)

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements.

My latest research has been focused on luminescent nanomaterials for the development of innovative oncological cures and technologies for detecting ionizing radiation in theranostic field. I am a recognized expert in thermoluminescence, radio-and photoluminescence spectroscopic techniques in steady state and time-resolved ultrafast regime, for the study of the electronic/excited-state properties of inorganic and hybrid nanoparticles together with scintillating composites. I acquired the capability to tune the materials' performance to the target applications spanning from the fields of physics to biotechnology. **I gained solid knowledge to develop new models for understanding the fundamentals of scintillation mechanism at the nanoscale, to design and fabricate new materials, and to create devices with performance overcoming the limits of technological tools currently used in oncology.** The great attention of the medical, scientific, and industrial communities in this topic is demonstrated by the excellence projects funded by Italy/EU that I coordinated in diverse research institutes and universities. **The strong interdisciplinary characters of my research allowed me to create national and international cooperation** with groups specialized in chemistry, medicine, and computational science **to complete my physics-oriented background.** I am the author and co-author of 37 papers (17 as first/corresponding author, 3 invited) published in international journals with average IF > 10. Among them, 2 are contributions to peer-reviewed edited volume/monographs. **To date, my work received 1393 citations (Scopus) with H-factor = 17 (1730 citations, H-factor= 19, Scholar).**

Awards

- (1) 2017 Top Papers Award - Nano Research - Nano Research 8 (2), 649-665 (2015). This award is given by the editorial board in recognition of the strong impact of the publication achieved in the previous two years.
- (2) Best Oral Presentation Award *Scintillation properties of advanced nanocomposite materials*, 11th LumDeTr (Bydgoszcz, Poland). LumDetr is the most influential global congress on scintillator materials. The award is given to the best oral communication by the conference scientific committee and peer-to-peer judges.

Fellowships.

Research Award 2015 under the Angelo Della Riccia Foundation (17 k€ for a duration of 12 months).

ADDITIONAL INFORMATION

I held the National Scientific Qualification as an associate professor in the Italian system for the disciplinary field PHYS-03/A Experimental Physics of Matter and Applications (ex 02/B1- M.D. No. 553/2021 and 589/2021)