

CURRICULUM VITAE – LUCIA NASI

PERSONAL INFORMATION

Lucia Nasi

Senior Researcher – IMEM-CNR, Parma, Italy

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CURRENT POSITION

Senior Researcher (II livello) – Istituto dei Materiali per l'Elettronica e il Magnetismo (IMEM),
CNR, Parma, Italy

WORK EXPERIENCE

2021 – present | Senior Researcher, IMEM-CNR, Parma (Italy)

Research on nanostructured materials, focusing on the correlation between their morphological, structural, chemical, magnetic and optical properties and their functional behaviour, investigated through advanced microscopy techniques.

Scientific responsibility for national research projects on photocatalytic and hybrid nanomaterials.

2001 – 2021 | Researcher, IMEM-CNR, Parma (Italy)

Work on nanostructured semiconductor materials, with emphasis on strain engineering, band-gap optimisation and interface analysis for optoelectronic and photovoltaic applications.

Scientific responsibility for projects on photocatalytic and photovoltaic nanomaterials.

1993 – 2001 | PhD Student and Research Fellow, MASPEC-CNR and IMEM-CNR (Italy)

Structural and optical characterisation of III–V and II–VI semiconductor heterostructures for photovoltaic and optoelectronic devices, within national and EU-funded projects.

EDUCATION AND TRAINING

1996 — PhD in Physics, University of Parma

Thesis: *Ordine a lungo range in strutture di GaInP/GaAs*

1993 — Master's Degree in Materials Science and Technology, University of Parma

Thesis: *Disordine di antifase in strutture di GaAs/Ge*

1992 — Degree in Physics, University of Parma

Thesis: *Studio di difetti indotti da disadattamento reticolare in strutture epitassiali di semiconduttori III-V mediante microscopia elettronica*

METHODOLOGICAL EXPERTISE

Extensive experience in advanced microscopy and analytical techniques for structural, morphological, chemical and magnetic characterisation of materials across multiple length scales.

- **TEM:** conventional, HRTEM, STEM-EDX, EELS; Lorentz TEM for magnetic domain analysis
 - **FIB-SEM:** cross-sectioning, 3D reconstruction, site-specific TEM lamella preparation
 - **SEM:** morphology, composition, **SEM-CL** analysis
 - **AFM/MFM:** topography and magnetic domain mapping
 - **Correlative & multiscale microscopy** integrating TEM, SEM-CL and AFM/MFM
 - **TEM sample preparation:** manual and FIB-based
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RESEARCH ACTIVITIES

Semiconductor Heterostructures

Research on nanostructured semiconductor heterostructures (III-V, II-VI, GaAs/Ge, SiGe) with dimensionalities ranging from thin films to nanowires and quantum dots.

Focus on band-gap engineering in lattice-mismatched systems and in the epitaxial growth of polar materials on non-polar substrates, with emphasis on strain relaxation and interface defect engineering.

Extensive work on InGaAs buffer layers for strain control and on strain-balanced multi-quantum wells for high-efficiency photovoltaic and thermophotovoltaic devices.

ZnS/ZnO Nanostructures

Investigation of the topotactic transformation of $\text{ZnS}(\text{en})_{0-5}$ precursors into ZnS and ZnO nanostructures.

Elucidation of atomic-scale lattice relaxation, porosity formation and defect generation, leading to mesoporous single-crystal ZnO with enhanced photocatalytic activity and potential applications in optoelectronics and sensing.

Perovskite and Perovskite-Inspired Materials

Study of halide perovskites (CsPbBr_3) and lead-free Ag/Bi-iodide thin films grown by Single-Source Thermal Ablation (SSTA).

Work focused on phase stability, defect evolution and optical/electronic properties for stable, environmentally friendly photovoltaic devices.

Magnetic Shape-Memory and Functional Magnetic Materials (NiMnGa)

Investigation of Ni–Mn–Ga Heusler thin films and nanostructures with magnetically driven shape-memory behaviour.

Multiscale correlation between microstructure and magnetic domain configuration using TEM (including Lorentz), SEM and AFM/MFM for sensing and actuation technologies.

Hybrid Nanostructured Materials and Carbon-Based Composites

Research on hierarchical hybrid systems based on CNTs, CNHs, carbon nanocones and graphene derivatives combined with metal-oxide and metal nanoparticles.

Sub-nanoscale structural and chemical studies aimed at optimising catalytic performance in hydrogen production, CO₂ reduction and green H₂O₂ synthesis.

PROJECTS AND SCIENTIFIC INVOLVEMENT

Scientific Responsibility

- **PRIN 2022 – SySSy-Cat: Synthetic and Structural Synergy Towards Advanced Heterogeneous Photoredox Catalysis – CNR Unit Coordinator.**
PI: Paolo Fornasiero, Università degli Studi di Trieste
- **PRIN 2017 – NANO-REDOX: Carbon-Based Nano-Hybrid Systems for Multi-Redox Electrocatalysis – CNR Unit Coordinator**
PI: Maurizio Prato, Università degli Studi di Trieste
- **PED4PV (2009–2014) – Industria 2015: Task Leader** for the optimisation of CIGS thin films for photovoltaic devices
PI: Massimo Mazzer, IMEM-CNR

Other Project Participation

Participation in multiple national and European projects in photovoltaic, magnetic and catalytic materials, with responsibility for microscopy activities.

CERIC-ERIC Access Award

- **2025 – Exploring Ni/Cu-based Single-Atom Catalysts on Graphitic Carbon Nitride Supports at the Atomic Scale**
Awarded access to Holographic TEM@UniSalento (AC-HAADF-STEM, EELS, EDX).
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TEACHING AND TRAINING

- Invited trainer at the International School of Electron Microscopy, University of Salento (Lecce, 2025).
 - Teaching activity at the PhD School of Materials Science, University of Parma (module on SPM).
 - Teaching contributions in microscopy and materials characterisation at the University of Catania.
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SUPERVISION & RESEARCH TRAINING

- Supervision and co-supervision of MSc and PhD theses in Physics and Materials Science
 - Scientific supervision of post-doctoral researchers
 - Member of international PhD juries (Universidad de Cádiz, Spain)
 - Training and mentoring of international students and early-career researchers
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REFEREEING

Reviewer for international peer-reviewed journals in materials science, microscopy and nanotechnology.

PUBLICATIONS & BIBLIOMETRIC INDICATORS (Web of Science)

- 169 publications
- H-index: 32