

Mattia Bassotti



WORK EXPERIENCE

- 06/02/2017-31/08/2018 **Employee at Fiorital S.p.a**
- Joined Fiorital as an apprentice at the Padua store and restaurant, starting with roles as dishwasher, stock clerk and shop assistant. Later focused mainly at the company headquarters in Venice on tasks such as recipe and procedure archiving, food cost calculation and sales data analysis.
- 05/07/2021-05/10/2021 **Post-Master Grant**
- University of Perugia. Supervisor: Prof. Giovanni Carlotti
- Investigation and characterization of innovative magnetic materials by micromagnetic simulations of magnetic skyrmions dynamics
- 01/01/2022-31/12/2024 **PhD in Physics**
- University of Perugia. Supervisor: Dr. Alberto Verdini
- Investigation on novel 2D materials by surface physics approach: growth and characterization of phosphorene and organic molecule (tetrapyrroles) ultra-thin films on metal substrates..
- 01/01/2025-31/03/2025 **Visiting at MPC/DIPC**
- Material Physics Center and Donostia International Physics Center, in San Sebastián, Spain
- Working in the ARPES laboratory for investigating the growth of phosphorene on metal substrate by molecular beam epitaxy and its electronic properties characterization.

RESEARCH ACTIVITY

During my Master's studies, I worked on magnetism and spintronics under the supervision of Prof. **Giovanni Carlotti, within the "Group of High-resolution Optical Spectroscopy and Related Techniques."** My thesis included both theoretical and experimental components: I performed micromagnetic simulations using MATLAB and MuMax, and carried out experimental characterization of magnetic multilayers using Brillouin light scattering (BLS) in a lab equipped with a Fabry-Pérot interferometer. This work led to publication no. (1).

I then began my PhD in the joint laboratory of Surface and Nanostructure Physics (CNR-IOM and University of Perugia), where I developed a strong interest in surfaces and ultrathin films. My PhD project consisted of three main research lines:

1. Growth and characterization of novel 2D phosphorus-based structures on metal substrates;
2. Investigation of the interaction between organic monolayers (tetrapyrroles) and metallic surfaces;
3. Use of phosphorus monolayers for electronic decoupling and templated growth of ordered

organic films on metals substrates.

Throughout my PhD, I gained extensive experience in thin film deposition, surface characterization, and operation of UHV systems and associated equipment. In particular, I first got experienced with LEED, AES, and UPS lab-based techniques for the study of phosphorus and organic molecules monolayers on metals.

Part of this research was then carried out during several beamtime at major European synchrotron facilities (Elettra, ALBA, BESSY II, SOLEIL), where I was the main proposer of three peer-reviewed beamtime proposals. These experiments involved the use of high-resolution XPS, NEXAFS, and ARPES to investigate phosphorus monolayers and ultrathin organic films on metallic substrates. Additionally, I submitted and obtained an experiment under the CERIC-ERIC program, which allowed me to perform Near-Ambient Pressure XPS to investigate the catalytic properties of blue phosphorene.

During my PhD, I also spent a research stay at the Materials Physics Center (MPC) in San Sebastián, Spain, under the supervision of Dr. Frederik Schiller. There, I further developed my skills in spectroscopy, particularly XPS and ARPES, and gained hands-on experience with STM and low-temperature STM. My research here focused on the growth of phosphorus-based structures on curved surfaces, which allow simultaneous access to a wide range of crystallographic orientations. These systems enable detailed studies of growth, morphology, and electronic properties of novel phosphorus thin films on unconventional crystal planes.

A second research stay at the Donostia International Physics Center (DIPC) toward the end of my PhD allowed me to continue and expand this work.

The PhD research resulted in publications no. (2) and (3).

In addition, I completed an internship at Kenosistec S.r.l. in Binasco (Milan, Italy), where I was involved in the assembly and commissioning of machinery for the production of innovative solar cells. This experience allowed me to gain initial insight into glove boxes, atomic layer deposition (ALD), spin coating, and effusion cell-based processes.

EDUCATION AND TRAINING

09/2022

SILS School

Two weeks school titled "Scuola Italiana di Luce di Sincrotrone" at Muggia (Trieste, Italy). The school aimed to give solid background on synchrotron-based techniques for scientific investigation, using both theoretical and practical lectures.

02/2021

Winter Biotechnology School

One week school in Perugia (Italy) on general topics related to Biotechnology.

PERSONAL SKILLS

Mother tongue(s)

Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	Advanced	Advanced	Advanced	Advanced	Advanced
	Replace with name of language certificate. Enter level if known.				
Spanish	Advanced	Advanced	Advanced	Advanced	Intermediate
	Replace with name of language certificate. Enter level if known.				

Communication skills	Through my work experience at the company, I learned to communicate effectively with both colleagues and customers, focusing on clear, concise, and goal-oriented exchanges to enhance team efficiency. Further refined these skills during my PhD, regularly interacting with collaborators and research groups to ensure productive teamwork, efficient project execution, and a positive working environment.
Organisational / managerial skills	Developed strong organizational and multitasking skills in both industry and academia. In my work experience, I learned to manage a variety of tasks efficiently, which led to gradually taking on roles with greater responsibility. During my PhD, I planned and coordinated multiple experimental campaigns, both in our lab and at synchrotron beamlines. This involved thorough pre-experiment preparation, measurement planning, resource management, and effective problem-solving, often requiring rapid reorganization of activities.
Job-related skills	<ul style="list-style-type: none">▪ Data acquisition, analysis and interpretation;▪ Experience with lab equipment and ultra-high vacuum equipment (ion sputtering, sample mounting, gas dosing, evaporation cell, mass spectrometer);▪ Experience with lab-based techniques (X-Ray Photoemission Spectroscopy, Ultraviolet Photoemission Spectroscopy, Low-Energy Electron Diffraction, Auger Electron Spectroscopy);▪ Experience with Scanning Tunneling Microscopy (STM), Scanning Tunneling Spectroscopy and Low-Temperature STM;▪ Scientific writing for beamtime proposal and scientific articles.▪ Critically understanding and evaluating scientific literature;▪ Public speaking at scientific conferences;▪ Skilled in scientific communication, teamwork, and interdisciplinary collaboration;▪ Experience with maintenance and small-scale repairs in laboratories;▪ Experience with synchrotron radiation -based techniques (X-Ray Photoemission Spectroscopy, Near-Edge X-ray Absorption Fine Structure, Angle-Resolved Photoemission Spectroscopy).
Computer skills	<p>Software:</p> <ul style="list-style-type: none">▪ Microsoft office▪ Igor pro▪ Matlab <p>Coding:</p> <ul style="list-style-type: none">▪ Python▪ C++
Other skills	<ul style="list-style-type: none">▪ Carpentry▪ Cooking▪ Photography
Driving licence	<ul style="list-style-type: none">▪ Category B

ADDITIONAL INFORMATION

Publications

- (1) Bassotti, Mattia, Raffaele Silvani, and Giovanni Carlotti. "From the spin eigenmodes of isolated Néel skyrmions to the magnonic bands of skyrmionic crystals: a micromagnetic study as a function of the interfacial Dzyaloshinskii-Moriya interaction and the exchange constants." *IEEE Magnetics Letters* 13 (2021): 1-5.
- (2) Baronio, Stefania, Bassotti Mattia et al. "Stabilization versus competing de-metalation, trans-metalation and (cyclo)-dehydrogenation of Pd porphyrins at a copper surface." *Nanoscale* 16.28 (2024): 13416-13424.
- (3) Bassotti, Mattia, et al. "Thermally Activated On-Surface Self-Metalation of Pd-Phthalocyanines." *Chemistry–A European Journal*: e202500944.

Scientific Proposal

- "The influence of a Phosphorous buffer layer on the assembling properties of Zn-TPP and Ni-TPP ultra-thin films grown on a Cu(110) substrate" at ALOISA beamline in ELETTRA (Accepted as Main Proposer)
- "Phosphorene buffer layer for the decoupling of ZnTPP thin-film on Cu(111)" at ALOISA beamline in ELETTRA (Accepted as Main Proposer)
- "Blue Phosphorus oxidation on curved Au(645) and Cu(645) crystals for small-molecule gas absorption" at NAP-XPS lab at Charles Prague University (Accepted as Main Proposer)
- "Electronic properties of one and two dimensional phosphorene on curved copper" at LOREA beamline in ALBA synchrotron (Accepted as Main Proposer)

Conferences

- ECOS24, June 2024, Harrogate (UK) – Oral talk
- MagIC+ conference, July 2021, online – Poster
- TMAG21, September 2021, Cefalù (IT) - Poster

Seminars

- IOM seminars – Oral Presentation (online)