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Experience

- **Postdoctoral Researcher** at CNR-IOM, Trieste (Italy) 16/01/2017 – present

Facility: CNR-IOM, Trieste (Italy)

Supervisor: Dr. Cristina Africh

Activity:

- Responsible of a variable-temperature scanning tunneling microscope;
- Development of fast scan technique for scanning probe microscopes;
- User support in scanning tunneling microscopy experiments;
- On-surface synthesis of graphene;
- Structural and electronic characterization of 2D materials by scanning tunneling microscopy (STM) and spectroscopy (STS) in ultra-high vacuum (UHV) at variable temperature (4K-900K). X-ray and ultra-violet photoelectron spectroscopy (XPS, UPS);
- Supervision of the students in the experimental activity.

References:

- Contract protocol IOM-CNR N. 21, 08/01/2020 and IOM-CNR N. 36, 10/01/2020 for period 16/01/2020 – 15/01/2021.
- Contract protocol IOM-CNR N. 3597, 16/11/2017 for period 16/01/2018 – 15/01/2020.
- Contract protocol IOM-CNR N. 3169, 07/10/2016 for period 16/01/2017 – 15/01/2018.
- Call reference n. IOM AR 010/2016 TS, 10/10/2016.

- **Postdoctoral Researcher** at ICN2, Barcelona (Spain) 09/02/2015 – 30/11/2016

Facility: Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona (Spain)

Supervisor: Prof. Aitor Mugarza

Activity:

- Responsible of a low-temperature scanning tunneling microscope (STM);
- On-surface synthesis of functionalized graphene nano-ribbons by molecular precursors;
- Structural and electronic characterization by STM and STS in ultra-high vacuum (UHV) at variable temperature (4K-300K);
- Synchrotron radiation techniques (XPS, XMCD);
- User support at ALBA synchrotron for STM measurements on BOREAS beamline (complementary to XPS and XMCD);
- Setup and maintenance of data acquisition and analysis software of LT-STM.

References:

- Contract signed by Lluís Bellafont Alvaro (ICN2 manager) on 07/01/2016.
- Contract signed by Lluís Bellafont Alvaro (ICN2 manager) on 09/02/2015 (see also **R1**).

- **Doctoral Student** at University of Trieste, Trieste (Italy) 01/01/2012 – 31/12/2014

Facilities: Elettra-Sincrotrone Trieste, Trieste (Italy). A.P.E. Research srl, Trieste (Italy).

Supervisors: Prof. Alessandro Baraldi; Prof. Alberto Morgante

Tutor: Dr. Andrea Goldoni

Activity:

- Study of sub-monolayer metal-organic molecules self-assembled on metal surfaces, focusing in particular on the molecule-molecule and molecule-substrate interaction;
- STM at room temperature in UHV; testing of scanning probe instrumentation (SPM) in collaboration with the APE Research srl enterprise;
- Experience with synchrotron radiation techniques (XPS, NEXAFS, XMCD) with more than 10 beamtimes in 3 different international facilities;
- Molecular beam epitaxy (MBE) of organic and metal-organic films in UHV.

References:

- Decree of the Rector, protocol 945 n. 28/2012, 19/01/2012, University of Trieste.
- Call “Supporting Human Assets in Research and Mobility” co-funded by the European Research Fund. Decree of the Rector 1245, 18/10/2011, University of Trieste (see also **R3**).
- Contract signed by Dr. Andrea Zacchigna (A.P.E. Research legal representative) and Prof. Francesco Peroni (Rector of the University of Trieste) on 27/02/2012.

- **Placement traineeship** at ICN2, Barcelona (Spain) 01/07/2013 – 20/12/2013

Facility: Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona (Spain)

Supervisor: Prof. Aitor Mugarza

Activity:

- Growth and characterization of graphene nano-islands by chemical vapor deposition (CVD);
- Study of electronic properties of confined 2D electronic systems by low temperature (4K) STM and STS.
- Chemical vapor deposition (CVD) of graphene nano-structures.

References:

- Contract signed by Pablo Ordejon Rontomé (ICN2 Director) on 01/07/2013 (see also **R2**).
- Contract signed by Pablo Ordejon Rontomé (ICN2 Director) and Prof. Lucia Pasquato (Coordinator of Nanotechnology PhD Course, University of Trieste) on 31/10/2013.

- **Master traineeship** at University of Trieste, Trieste (Italy) 01/03/2011 – 30/10/2011

Facility: TASC IOM-CNR, Trieste (Italy)

Supervisor: Prof. Silvio Modesti

Activity:

- STM and STS in UHV at low-temperature (4K) of sub-monolayers of organic molecules;
- Single molecule conductance measurements by STM break junctions.

- **Academic traineeship** at University of Trieste, Trieste (Italy) 01/03/2009 – 30/10/2010

Facility: Elettra-Sincrotrone Trieste, Trieste (Italy)

Supervisor: Prof. Alessandro Baraldi

Activity:

- Variable temperature high-resolution XPS with synchrotron light source.

- **Academic traineeship** at University of Trieste, Trieste (Italy) 01/07/2008 – 30/09/2008

Facility: Elettra-Sincrotrone Trieste, Trieste (Italy)

Supervisor: Prof. Fulvio Parmigiani

Activity:

- Spin- and angle-resolved photoemission technique (ARPES).

Education

- **Ph. D. (Doctor Europaeus) in Nanotechnology** 2012 - 2014

Issuing institution: Università degli Studi di Trieste, Trieste (Italy) – Graduate School of Nanotechnology

Date of degree: 24/03/2015

Additional certification: Doctor Europaeus

Thesis title: Adsorption, metalation and magnetic properties of tetra phenyl porphyrins on metal surfaces

Supervisors: Prof. Alessandro Baraldi; Prof. Alberto Morgante

Tutor: Dr. Andrea Goldoni

Doctoral cycle: XXVII

Reference: <http://hdl.handle.net/10077/10898>

Activity: Scanning tunneling microscopy (STM) measurements and synchrotron radiation spectroscopy (XPS, NEXAFS, XMCD) of organic molecules on metal surfaces.

● **M. Sc. in Condensed Matter Physics** 2009 - 2011

Issuing institution: Università degli Studi di Trieste, Trieste (Italy)

Date of degree: 18/11/2011

Thesis title: Tunneling spectroscopy and molecular conductance measurements of metal phthalocyanine on gold

Supervisor: Prof. Silvio Modesti

Academic year: 2010-2011

Final degree mark: 110/110

Reference: N. 2011A605, University of Trieste

Activity: Scanning tunneling microscopy and spectroscopy (STM, STS) and break junction technique on organic molecules on metal surfaces.

● **B. Sc. in Physics** 2005 - 2008

Issuing institution: Università degli Studi di Trieste, Trieste (Italy)

Date of degree: 19/03/2009

Thesis title: Origine della componente radiale dello spin degli stati di superficie dell'Au(111)

Supervisor: Prof. Fulvio Parmigiani

Academic year: 2007-2008

Final degree mark: 106/110

Reference: N. 2009177, University of Trieste

Activity: Angle and spin resolved photoemission spectroscopy techniques.

Training courses

T1. *Title:* “First EUSMI | NFFA-Europe Joint School on Data Management”

Place: ICTP campus, Trieste (Italy)

Period: 10/12/2019 – 11/12/2019 *Duration:* 12 h

Reference: Certificate released by Dr. Stefano Cozzini. <https://datamanagementschool.nffa.eu/>

T2. *Title:* Course on “Introduzione di machine learning”

Place: CNR-IOM, Trieste (Italy)

Period: 19/11/2019 – 05/12/2019 *Duration:* 20 h

Reference: Certificate released by Dr. Stefano Fabris (CNR-IOM Director), Protocol IOM-CNR-IOM N. 0003021, 05/12/2019.

T3. *Title:* Summer Course “International conference on Novel 2D Materials Explored Via Scanning Probe Microscopy and Spectroscopy”

Place: University of Basque Country, Donostia-SanSebastian (Spain)

Period: 25/06/2018 – 29/06/2018 *Duration:* 50 h

Reference: Certificate released by Vincente Gascon Gascon (Academic secretary of the Summer Courses of the University of the Basque Country).

T4. *Title:* Course on “Python for scientific data management”

Place: CNR-IOM, Trieste (Italy)

Period: 05/06/2018 – 22/06/2018 *Duration:* 31.5 h

Reference: Certificate released by Dr. Stefano Fabris (CNR-IOM Director), Protocol IOM-CNR-IOM N. 0001773, 22/06/2018.

- T5.** *Title:* Summer Course “On-Surface Synthesis International Workshop (OSS 16)”
Place: University of Basque Country, Donostia-San Sebastian (Spain)
Period: 27/06/2016 – 30/06/2016 *Duration:* 40 h
Reference: Certificate released by Vincente Gascon Gascon (Academic secretary of the Summer Courses of the University of the Basque Country).
- T6.** *Title:* Short Winter School on Nano and Bio-Technology
Place: Università degli Studi di Trieste (Italy)
Period: 27/01/2014 – 28/01/2014 *Duration:* 16 h
Reference: Certificate signed by Prof. Lucia Pasquato (on behalf of the Organizing committee).
- T7.** *Title:* Interdisciplinary PhD Spring School
Place: University of Udine (Italy)
Period: 07/03/2013 - 08/03/2013
Reference: Certificate signed by Prof. Michele Morgante (University of Udine) on 08/03/2013.
- T8.** *Title:* Course on LabVIEW basics
Place: Elettra-Sincrotrone Trieste (National Instruments certified)
Period: 02/05/2013 – 06/06/2013 *Duration:* 48 h
- T9.** *Title:* Course on Molecular Self Assembly and Nanostructures
Place: Università degli Studi di Trieste (Italy)
Period: 06/09/2012 – 26/09/2012
- T10.** *Title:* School and Workshop on Innovations in Strongly Correlated Electronics Systems
Place: International Center for Theoretical Physics, Trieste (Italy)
Period: 06/08/2012 – 17/08/2012 *Duration:* 80 h
Reference: Certificate released by F. Quevedo (ICTP Director) <http://indico.ictp.it/event/a11179/>
- T11.** *Title:* School on Synchrotron and FEL Based Methods and their Multi-disciplinary Applications
Place: International Center for Theoretical Physics, Trieste (Italy)
Period: 19/03/2012 – 30/03/2012 *Duration:* 40 h
Reference: Certificate released by F. Quevedo (ICTP Director), <http://indico.ictp.it/event/a11156/>
- T12.** *Title:* Spring course on Diffraction Methods for Nanostructured Materials
Place: Università degli Studi di Trieste (Italy)
Period: 15/03/2012 *Duration:* 4 h

Scientific interests

- Study of metal-organic molecules self-assembled on metal surfaces, focusing in particular on the molecule-molecule and molecule-substrate interaction and the magnetic properties of the system for spintronics applications. (see **P14. P15. P16. P18. P19.**; **C8. C9. C10. C11. C12. C13. C14.**; **S4. S5. S6. S7. S8. S10. S11. S14. S15.**).
- On-surface synthesis of functionalized graphene nano-ribbons and nano-porous networks by molecular precursors. Synthesis of 1D and 2D materials for application in nano-structures based sensors and devices; study of their structural and electronic properties and chemical stability. (see **P11. P13.**; **C6. C7.**; **R1. R7. R8. R9.**)

- Growth and characterization of 1D (carbon nanotubes) and confined 2D materials (graphene). (see **P1. P2. P3. P12. P17.;** **C1. C2.;** **R2. R3. R4. R5. R6.;** **S2.**)
- Development of new instrumentation for the increase of the temporal resolution in scanning probe microscopy and related image-processing methods. (see **P7.;** **C3. C4. C5.;** **R5. R6.**)

Technical skills

- Scanning tunneling microscopy (**STM**) and spectroscopy (**STS**) (constant current and constant height) at variable temperature (**4K-600K**). STM break junctions. (Continuous activity in 4 different laboratories).
- Angle resolved X-ray photoelectron spectroscopy (**XPS, ARPES**) and X-ray absorption (**NEXAFS, XMCD**) synchrotron techniques (more than 10 beamtimes in 3 different large-scale facilities).
- Molecular beam evaporation (**MBE**); chemical vapour deposition (**CVD**).

Scientific activity

Participation in peer-reviewed scientific projects

- S1.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – SUPERESCA beamline
Proposal ID: 20195053
Title: Probing the polymerization of small hydrocarbons on a Ni model catalyst
Proposer: Laerte Patera
Period: 29/05/2020 – 03/06/2020
- S2.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – ALOISA beamline
Proposal ID: 20195192
Title: N-doped Graphene on Ni(111): Growth and Reactivity
Proposer: Sara Fiori
Period: 10/02/2020 – 15/02/2020
- S3.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – BAD ELPH beamline
Proposal ID: 20155384
Title: Addressing the electronic properties of chiral molecules on metal surfaces
Proposer: Giovanni Di Santo
Period: 16/05/2016 – 23/05/2016
- S4.** *Facility:* ALBA synchrotron, Cerdanyola del Valles (Spain) – BL29 BOREAS beamline
Proposal ID: 2014071021
Title: Magnetic anisotropy and Fe moment enhancement on O₂ dosed - Fe Phthalocyanine sub-monolayers on Ag(110)
Proposer: Elena Bartolomé
Period: 20/05/2015 – 24/05/2015
- S5.** *Facility:* ALBA synchrotron, Cerdanyola del Valles (Spain) – BL29 BOREAS beamline
Proposal ID: 2014071071
Title: On the nature of the magnetism of lanthanide-based metal-organic networks
Proposer: Julio Camarero
Period: 26/05/2015 – 30/05/2015
- S6.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) - ALOISA beamline

- Proposal ID:* 20145184
Title: Study of metalation of metal-free TetraphenylPorphyrin on oxidized metal surfaces
Proposer: Alberto Verdini
Period: 12/01/2015 – 17/01/2015
- S7.** *Facility:* HZB BESSY II synchrotron, Berlin, Germany – HE-SGM beamline
Proposal ID: 142-01002-ST/R
Title: Investigating the Electronic properties of molecular Fe complexes deposited on Graphene/Ni(111)
Proposer: Maddalena Pedio
Period: 24/09/2014 – 29/09/2014
- S8.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) - ALOISA beamline
Proposal ID: 20140105
Title: Study of the growth of Ruthenocene molecules on Au(111) and Ag(111)
Proposer: Alberto Verdini
Period: 01/09/2014 – 07/09/2014
- S9.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) - BEAR beamline
Proposal ID: 20140068
Title: Charge generation and charge transfer in new organic-non organic MAPbI(3-x)Clx perovskite used for photovoltaic application
Proposer: Marco Caputo
Period: 17/07/2014 – 24/07/2014
- S10.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) - APE beamline
Proposal ID: 20135155
Title: Distance dependence of the magnetic coupling of metallorganic compounds with a ferromagnetic substrate
Proposer: Giovanni Di Santo
Period: 10/02/2014 – 16/02/2014
- S11.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – BAD ELPH beamline
Proposal ID: 20130112
Title: Symmetry of the Kondo state of a simple adsorbed molecule
Proposer: Silvio Modesti
Period: 18/11/2013 – 24/11/2013
- S12.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) - ESCAMICROSCOPY beamline
Proposal ID: 20125348
Title: Investigation of the electronic structure of ICP - CVD produced a:Si-H film
Proposer: Marco Caputo
Period: 31/05/2013 – 03/06/2013
- S13.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – ALOISA beamline
Proposal ID: 20125327
Title: Study of a model electrode for light-driven Water Splitting: combination of organic dyes (photon sensitizers) and Ru4-Polyoxometalates (Water Oxidation Catalysts) on TiO2(110)
Proposer: Andrea Goldoni
Period: 20/05/2013 – 26/05/2013
- S14.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – BAD ELPH beamline
Proposal ID: 20125324
Title: Investigation of pristine and K-doped mixed C60 and Picene thin films

Proposer: Marco Caputo
Period: 11/04/2013 – 17/04/2013

- S15.** *Facility:* Elettra-Sincrotrone Trieste, Trieste (Italy) – BACH beamline
Proposal ID: 20120156
Title: Core level photoemission and NEXAFS investigation of pristine and K-doped Picene thin film
Proposer: Marco Caputo
Period: 19/11/2012 – 25/11/2012

Responsibility of R&D projects funded through competitive calls

- R1.** *Project title:* “Correlation effects in structural, electronic and magnetic properties of doped graphene nanostructures.”
Funding entity: Fondazione “A. Della Riccia”
Reference: Hard copy letter; http://theory.fi.infn.it/casalbuoni/dellariccia/Vincitori_2014_14.html
Total amount: 17,000 €
Period: 01/01/2015 – 31/12/2015
Facility: Catalan Institute of Nanoscience and Nanotechnology, Barcelona (Spain)
Activity: Comparative study of the growth, structural characterization and chemical stability of functionalized graphene nano-ribbons obtained by the on-surface synthesis of molecular precursors on gold surface. Use of scanning tunneling microscopy (STM) and X-ray photoemission spectroscopy (XPS) techniques.
- R2.** *Title:* Europass-Mobilità placement – Tirocini formativi
Reference: decree of the Rector 1254/2012, Protocol 22793, 8/11/2012, University of Trieste.
Funding entity: Italian Ministry of Education, University and Research through Università degli Studi di Trieste
Total amount: 2,000 €
Period: 01/07/2013 - 31/10/2013
Facility: Catalan Institute of Nanoscience and Nanotechnology, Barcelona (Spain)
Activity: Study of electron confinement by low temperature (4K) STM and STS in graphene nano-islands grown by CVD on Cu(111) single crystal.
- R3.** *Project title:* “Study and characterization of carbon nanotubes with defined chirality for photovoltaics applications”
Reference code: FP1206199005
Funding entity: European Social Fund, ESF 2007-2013
Total amount: 37,000 €
Period: 27/02/2012 – 31/12/2014
Facility: Elettra-Sincrotrone Trieste, Trieste (Italy)
Activity: Study of metal-organic molecules self-assembled on ferromagnetic metal surfaces, focusing in particular on their adsorption, metalation and magnetic properties. Bottom-up synthesis of carbon nanotubes from organic complexes containing iron ions in solution. The research activity has been monthly monitored by the university and the enterprise.

Participation in R&D projects funded through competitive calls

- R4.** *Project title:* “Metal Activated 2D cARbon-based platforMs (MADAM)”
Funding entity: Italian Ministry of University, Research and Education
Total amount: 1,199,999.44 €
Coordinator: Prof. Cristiana Di Valentin
Reference: -
Place: CNR-IOM, Trieste (Italy)

Period: 01/06/2019 - 31/05/2022

Activity: Doping of CVD graphene with transition metals

- R5.** *Project title:* “Nanoscience Foundries And Fine Analysis (NFFA) – Europe”
Funding entity: Horizon 2020 EU Research and Innovation
Total amount: 11,759,061 € (CNR unit: 2,758,163.06 €)
Coordinator: Prof. Giorgio Rossi
References: Grant Agreement 654360. Protocol IOM-CNR-IOM N. 0003270, 05/12/2018.
Place: CNR-IOM, Trieste (Italy)
Period: 16/01/2017 - ongoing
Activity: National and international user support in scanning tunneling microscopy and spectroscopy experiments. Development of a fast scan module and its interfacing with various commercial scanning tunneling microscopes. Development of LabVIEW acquisition software and Python data analysis software. First tests with atomic force microscopes.
- R6.** *Project title:* “Progetto Strategico NFFA-Trieste”
Funding entity: Italian Ministry of University, Research and Education
Total amount: 2,000,000 €/year/unit since 2012
Coordinator: Prof. Giorgio Rossi
References: Protocol IOM-CNR-IOM N. 0003270, 05/12/2018.
Place: CNR-IOM, Trieste (Italy)
Period: 16/01/2017 - ongoing
Activity: Implementation of fast scan ability in scanning probe microscopes for operando experiments.
- R7.** *Project title:* “Functional molecular nano-structures for optoelectronic devices: towards 3 contacts devices (FUNMOLDEV)”
Reference code: MAT2016-78293-C6-2-R.
Funding entity: Ministerio de Economía, Industria y Competitividad (Spain)
Total amount: 181,500 €
Coordinator: Jose Ignacio Pascual Chico
Principal investigator: Prof. Aitor Mugarza Ezpeleta
Place: Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona (Spain)
Period: 30/12/2016 - 30/11/2017
Activity: Synthesis, structural and electronic characterization of functionalized Chevron type graphene nano-ribbons (GNRs) using triphenyl derivatives as precursors. Synthesis of 1D GNR superlattices and 2D nanoporous networks.
- R8.** *Project title:* “Covalent hybrids on surfaces (SUPERHYBRID)”
Reference code: MAT2013-46593-C6-5-P.
Funding entity: Ministerio de Economía, Industria y Competitividad (Spain)
Total amount: 57,143 €
Coordinator: Jose Ignacio Pascual Chico
Principal investigator: Prof. Aitor Mugarza Ezpeleta
Place: Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona (Spain)
Period: 09/02/2015 - 31/12/2016
Activity: Synthesis of intrinsically doped graphene nano-ribbons. Growth and electronic characterization of surface alloys with strong spin-orbit coupling. Study of the magnetism of lanthanide-based metal-organic networks.
- R9.** *Project title:* “Grups de Recerca Consolidats, SGR 2014 - 2016”
Reference code: 2014 SGR 715. ECO/2663/2013, DOGC N. 6525, 19.12.2013.
Funding entity: Agència de Gestió d'Ajuts Universitaris i de Recerca (Spain)
Total amount: 19,200 €

Coordinator: Prof. Aitor Mugarza Ezpeleta
Place: Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona (Spain)
Period: 14/04/2015 - 31/12/2016
Activity: On-surface synthesis of graphene nano-ribbons with functional groups starting from molecular precursors and their characterization with STM, STS and XPS.

- R10.** *Project title:* “Supramolecularly Templated Synthesis of Homochiral Carbon Nanotubes for Photovoltaic Devices (SUPRACARBON)”
Reference code: B11J11002520008 (CINECA reference RBF10DAK6_003).
Funding entity: Ministero dell'Istruzione, dell'Universita' e della Ricerca (Italy)
Total amount: 192,300 €
Coordinator: Dr. Giovanni Di Santo, INSTM
Place: Elettra-Sincrotrone Trieste, Trieste (Italy)
Activity: Supramolecular synthesis of homochiral carbon nanotubes for photovoltaic devices. Synthesis of carbon nanotubes from organic complexes containing iron ions in solution.

Ongoing scientific collaborations

- Prof. Giovanni Comelli, University of Trieste (Italy)
- Prof. Cristiana Di Valentin, University Milano-Bicocca (Italy)
- Prof. Aitor Mugarza, ICN2, Barcelona (Spain)
- Dr. Cinzia Cepek, CNR-IOM, Trieste (Italy)
- Prof. Maria Peressi, University of Trieste (Italy)
- Prof. Friedrich Esch, Technical University of Munich (Germany)

Reviewer activity

- Reviewer for *ACS Applied Materials & Interfaces* (Impact Factor: 8.456)
- Reviewer for *Carbon* (Impact Factor: 7.466)

Participation in evaluation committees

- Member of the committee for the technical evaluation of a control electronics for STM (value 57.000 €). Public announcement: Protocol IOM-CNR N. 0004021, 29/12/2017. Appointment: Protocol IOM-CNR N. 0001808, 25/06/2018.

Teaching and dissemination activity

Teaching

- Appointment to “Cultore della Materia” for the Academic years 2020/2021 to 2022/2023 in the SSD FIS/01 and FIS/03. University of Trieste, Physics Department, 12/11/2020.
- Teaching assistant the course “Fisica newtoniana” held by Prof. Giovanni Comelli for the Bachelor degree in Physics, University of Trieste. Academic year 2020-2021. References: Contract digitally signed, 05/11/2020, University of Trieste (Call protocol 625/VII/1, 09/09/2020, University of Trieste).
- Teaching assistant for the course “Solid state physics laboratory” held by Prof. Silvio Modesti for the Master degree in Physics, University of Trieste. Academic years 2018-2019, 2019-2020. References: Contract protocol n. 142894, 14/11/2019, University of Trieste (Call protocol 897, 24/09/2019, University of Trieste). Contract protocol n. M8770, 26/11/2018, University of Trieste (Call protocol 942, 25/09/2018, University of Trieste).

- Lecturer at the 1st EUSMI | NFFA-Europe Joint School on Data Management with a lecture entitled “Digital logbooks for scientific research”, ICTP campus, Trieste (Italy). 11/12/2019. Reference: <https://datamanagementschool.nffa.eu/>
- Lecturer at the 2nd NFFA Summer school with a lecture entitled “Scanning probe spectroscopy”, Area Science Park Basovizza, Trieste (Italy). 12/07/2018. Reference: <https://www.nffa.eu/summer-school-2018>

Thesis supervision

- Doctoral Thesis tutor. Candidate: Valeria Chesnyak, Graduate School in Nanotechnology, Università degli Studi di Trieste, Doctoral cycle: XXXVI.
- Doctoral Thesis tutor. Thesis title: “N-doped Graphene on Ni: growth, structure and reactivity”. Candidate: Sara Fiori, Graduate School in Nanotechnology, Università degli Studi di Trieste, Doctoral cycle: XXXIII, Reference: Certificate signed by Prof. Lucia Pasquato (Coordinator of Nanotechnology PhD Course, University of Trieste) on 04/12/2018.
- Master Thesis co-supervisor. Thesis title: “Machine Learning techniques and visualization tools for STM images at CNR-IOM developed within the NFFA-EUROPE project”. Candidate: Tommaso Rodani, Mathematics Department, Data science and scientific computing course, Università degli Studi di Trieste, Academic year: 2019-2020. 18/09/2020.
- Bachelor Thesis co-supervisor. Thesis title: “Python software development for Scanning Tunneling Microscopy: analysis and classification of experimental images”. Candidate: Daniele Irto, Physics Department, Università degli Studi di Trieste, Academic year: 2019-2020. 18/09/2020.
- Bachelor Thesis co-supervisor. Thesis title: “Python software development for Scanning Tunneling Microscopy: recognition of the characteristic aspects of a physical system”. Candidate: Teresa Zio, Physics Department, Università degli Studi di Trieste, Academic year: 2019-2020. 16/10/2020.
- Bachelor Thesis co-supervisor. Thesis title: “STM a basse temperature su materiali bidimensionali: dall’imaging alla spettroscopia”. Candidate: Francesco Armillotta, Physics Department, Università degli Studi di Trieste, Academic year: 2016-2017. Reference: Certificate signed by Prof. Giacomo Vito Margagliotti (as Coordinator of Physics degree at University of Trieste) Protocol 1299/2018, on 04/12/2018, University of Trieste.

Scientific dissemination and press

- Participation at the Trieste Mini Maker Faire with the installation “Toccare l’invisibile” to explain the principles of STM 24-26/05/2019 (<https://trieste.makerfaire.com/maker/entry/441/>)
- Interview for the national TV “Futuro24: alta tecnologia con i materiali innovativi” broadcasted on 01/03/2019 <http://futuro24.blog.rainews.it/2019/03/01/futuro24-alta-tecnologia-con-i-materiali-innovativi/>
- Several newspaper articles from various countries for the work on “Nanoporous graphene” <https://icn2.cat/en/news/4141-icn2-in-the-media-nanoporous-graphene-for-smart-sensors> (relative to publication **P11**.)
- Newspaper article entitled “Su Physical Review uno studio tutto triestino”, Il Piccolo, page 19, 07/12/2010 (relative to publication **P25**.)

Publications

Journal articles

Total publications: 26

Total citations: 327 (Scopus)

h-index: 8 (Web of Science)

- P1.** “Inside out” growth method for high-quality nitrogen-doped graphene
S Fiori, D Perilli, M Panighel, C Cepek, A Ugolotti, A Sala, H Liu, G Comelli, C Di Valentin, C Africh
Carbon 11(20), 8887-8892 (2020) [10.1016/j.carbon.2020.09.056](https://doi.org/10.1016/j.carbon.2020.09.056)
Impact Factor: 8.821, ISSN: 0008-6223
Role: Participation in experiment design, STM and XPS measurements and data analysis.
- P2.** Mechanism of CO Intercalation through the Graphene/Ni(111) Interface and Effect of Doping
D Perilli, S Fiori, M Panighel, H Liu, C Cepek, M Peressi, G Comelli, C Africh, C Di Valentin
The Journal of Physical Chemistry Letters 171, 704-710 (2021) [10.1021/acs.jpcllett.0c02447](https://doi.org/10.1021/acs.jpcllett.0c02447)
Impact Factor: 6.71, ISSN: 1948-7185
Role: Participation in STM and XPS measurements.
- P3.** Stabilizing Edge-Fluorination in Graphene Nanoribbons
M Panighel*, S Quiroga, P Brandimarte, C Moreno, A Garcia-Lekue, M Vilas-Varela, D Rey, G Sauthier, G Ceballos, D Peña*, A Mugarza*
ACS Nano 14(9), 11120–11129 (2020) [10.1021/acsnano.0c01837](https://doi.org/10.1021/acsnano.0c01837)
Impact Factor: 13.903, ISSN: 1936-0851
Role: *Corresponding author. Experiment design. Responsible of STM and XPS measurements and data analysis.
- P4.** A cryogenic solid-state reaction at the interface between Ti and the Bi₂Se₃ topological insulator
K Ferfolja, M Fanetti, S Gardonio, M Panighel, I Piš, S Nappini and M Valant
Journal of Materials Chemistry C (2020) [10.1039/D0TC00863J](https://doi.org/10.1039/D0TC00863J)
Impact Factor: 7.059, ISSN: 1936-0851
Role: Responsible of STM measurements and analysis.
- P5.** Enhanced Magnetism through Oxygenation of FePc/Ag (110) Monolayer Phases
E Bartolome, J Bartolome, F Sedona, J Lobo-Checa, D Forrer, J Herrero-Albillos, M Piantek, J Herrero-Martín, D Betto, E Velez-Fort, L Miguel García, M Panighel, A Mugarza, M Sambì, F Bartolomè
The Journal of Physical Chemistry C (2020) [10.1021/acs.jpcc.0c01988](https://doi.org/10.1021/acs.jpcc.0c01988)
Impact Factor: 14.695, ISSN: 1520-5126
Role: Participation in STM and XMCD measurements.
- P6.** Electronic structure of MAPbI₃ and MAPbCl₃: importance of band alignment
M Caputo, N Cefarin, A Radivo, N Demitri, L Gigli, J R Plaisier, M Panighel, G Di Santo, S Moretti, A Giglia, M Polentarutti, F De Angelis, E Mosconi, P Umari, M Tormen, A Goldoni
Scientific reports Vol 9, 1-11 (2019) [10.1038/s41598-019-50108-0](https://doi.org/10.1038/s41598-019-50108-0)
Impact Factor: 4.525, ISSN: 2045-2322
Role: Participation in XPS and UPS measurements.
- P7.** The new FAST module: a portable and transparent add-on module for time-resolved investigations with commercial scanning probe microscopes
C Dri, M Panighel*, D Tiemann, L L Patera, G Troiano, Y Fukamori, F Knoller, B A J Lechner, G

- Cautero, D Giuressi, G Comelli, J Fraxedas, C Africh, F Esch
Ultramicroscopy Vol 205, 49-56 (2019) [10.1016/j.ultramic.2019.05.010](https://doi.org/10.1016/j.ultramic.2019.05.010)
Impact Factor: 2.644, ISSN: 0304-3991
Role: *Corresponding author. Development of the acquisition (LabVIEW) and analysis (Python) software. Testing on STM. Participation in the AFM testing.
- P8.** *Growth, morphology and stability of Au in contact with the Bi₂Se₃(0001) surface*
M Fanetti, I Mikulska, K Ferfolja, P Moras, P M Sheverdyeva, M Panighel, A Lodi-Rizzini, I Piš, S Nappini, M Valant, S Gardonio
Applied Surface Science Vol 471, 753-758 (2019) [10.1016/j.apsusc.2018.11.140](https://doi.org/10.1016/j.apsusc.2018.11.140)
Impact Factor: 4.439, ISSN: 0169-4332
Role: Responsible of STM measurements.
- P9.** *Critical role of phenyl substitution and catalytic substrate on the surface-assisted polymerization of dibromobianthracene derivatives*
C Moreno, M Panighel, M Vilas-Varela, G Sauthier, G Ceballos, D Peña, A Mugarza
Chemistry of Materials 2019 Vol 31, 331-341 (2018) [10.1021/acs.chemmater.8b03094](https://doi.org/10.1021/acs.chemmater.8b03094)
Impact Factor: 10.159
Role: Participation in STM measurements.
- P10.** *Improved recovery time and sensitivity to H₂ and NH₃ at room temperature with SnO_x vertical nanopillars on ITO*
L D'Arzié, V Alijani, S T Suran Brunelli, F Rigoni, G Di Santo, M Caputo, M Panighel, S Freddi, L Sangaletti, A Goldoni
Scientific Reports 8:10028 (2018) [10.1038/s41598-018-28298-w](https://doi.org/10.1038/s41598-018-28298-w)
Impact Factor: 4.609, ISSN: 2045-2322
Role: Participation in sample growth and resistivity measurements.
- P11.** *Bottom-up synthesis of multifunctional nanoporous graphene*
C Moreno, M Vilas-Varela, B Kretz, A Garcia-Lekue, M V Costache, M Paradinas, M Panighel, G Ceballos, S O Valenzuela, D Peña, A Mugarza
Science 360, 199–203 (2018) [10.1126/science.aar2009](https://doi.org/10.1126/science.aar2009)
Impact Factor: 41.058, ISSN: 1095-9203
Role: Participation in STM measurements and data analysis.
- P12.** *Graphene on nickel (100) micrograins: Modulating the interface interaction by extended moiré superstructures*
Z Zou, V Carnevali, M Jugovac, L L Patera, A Sala, M Panighel, C Cepek, G Soldano, M M Mariscal, M Peressi, G Comelli, C Africh
Carbon 130, 441 (2018) [10.1016/j.carbon.2018.01.010](https://doi.org/10.1016/j.carbon.2018.01.010)
Impact Factor: 7.082, ISSN: 0008-6223
Role: Responsible for STM decay measurements.
- P13.** *On-surface synthesis of superlattice arrays of ultra-long graphene nanoribbons*
C Moreno, M Paradinas, M Vilas-Varela, M Panighel, G Ceballos, D Peña, A Mugarza
Chemical Communications 54, Issue 68, 9402-9405 (2018) [10.1039/C8CC04830D](https://doi.org/10.1039/C8CC04830D)
Impact Factor: 6.29, ISSN: 1359-7345
Role: Participation in STM measurements.
- P14.** *Multi-orbital charge transfer at highly oriented organic/metal interfaces*
G Zamborlini, D Luftner, Z Feng, B Kollmann, P Puschnig, C Dri, M Panighel, G Di Santo, A Goldoni, G Comelli, M Jugovac, V Feyer, C M Schneider
Nature Communications 8, 335 (2017) [10.1038/s41467-017-00402-0](https://doi.org/10.1038/s41467-017-00402-0)
Impact Factor: 13.691, ISSN: 2041-1723

- Role:* Participation in scanning tunneling microscopy measurements and data analysis.
- P15.** *Partial Oxidation in a Dense Phase Sub-Monolayer of Fe-Phthalocyanine on Ag (110)*
 E Bartolomé, J Bartolomé, F Sedona, J Herrero-Albillos, J Lobo, M Piantek, L M García, M Panighel, A Mugarza, M Sambì, F Bartolomé
 Solid State Phenomena 257, 219 (2016) [10.4028/www.scientific.net/SSP.257.219](https://doi.org/10.4028/www.scientific.net/SSP.257.219)
 ISSN: 1662-9779
Role: Participation in X-ray magnetic circular dichroism measurements.
- P16.** *Manipulating the Topological Interface by Molecular Adsorbates: Adsorption of Co-Phthalocyanine on Bi₂Se₃*
 M Caputo, M Panighel, S Lisi, L Khalil, G Di Santo, E Papalaraou, M Konczykowski, L Krusin-Elbaum, A Hruban, P Kumar Das, J Fujii, I Vobornik, L Perfetti, A Goldoni, A Mugarza, M Marsi
 Nano Letters 16 (6), 3409 (2016) [10.1021/acs.nanolett.5b02635](https://doi.org/10.1021/acs.nanolett.5b02635)
 Impact Factor: 13.779, ISSN: 1530-6984
Role: Responsible for scanning tunneling microscopy measurements. Participation in angle-resolved photoemission measurements.
- P17.** *High-quality graphene on single crystal Ir(111) films on Si(111) wafers: Synthesis and multi-spectroscopic characterization*
 C Struzzi, NI Verbitskiy, AV Fedorov, A Nefedov, O Frank, M Kalbac, G Di Santo, M Panighel, A Goldoni, J Gärtner, W Weber, M Weinl, M Schreck, C Wöll, H Sachdev, A Grüneis, L Petaccia
 Carbon 81, 167 (2015) [10.1016/j.carbon.2014.09.045](https://doi.org/10.1016/j.carbon.2014.09.045)
 Impact Factor: 6.196, ISSN: 0008-6223
Role: Responsible for scanning tunneling microscopy measurements. Participation in angle-resolved photoemission measurements.
- P18.** *Solid state effects on the electronic structure of H₂OEP*
 M Marsili, P Umari, G Di Santo, M Caputo, M Panighel, A Goldoni, M Kumar, M Pedio
 Physica Chem Phys 16, 27104 (2014) [10.1039/C4CP03450C](https://doi.org/10.1039/C4CP03450C)
 Impact Factor: 4.493, ISSN: 1463-9076
Role: Participation in photoemission measurements.
- P19.** *Metallic picene/C₆₀ heterojunctions and the effect of potassium doping*
 M Caputo, M Panighel, L Petaccia, G Di Santo, C Struzzi, A Goldoni
 Physica Review B 90, 201401(R) (2014) [10.1103/PhysRevB.90.201401](https://doi.org/10.1103/PhysRevB.90.201401)
 Impact Factor: 3.736, ISSN: 1098-0121
Role: Participation in photoemission measurements.
- P20.** *XPS studies of the adsorption characteristics of 2H-TPP at Fe/Si interface*
 C Lal, G Di Santo, M Caputo, M Panighel, B Taleatu, A Goldoni, I P Jain
 Optoelectronics and Advanced Materials, Rapid Communications 8(5-6), 465-469 (2014)
 ISSN: 18426573
- P21.** *Electronic structure of Fe₃Si on Si(100) substrates*
 C Lal, G Di Santo, M Caputo, M Panighel, BA Taleatu, A Goldoni, IP Jain
 AIP Conference Proceedings 1591, 913 (2014) [10.1063/1.4872800](https://doi.org/10.1063/1.4872800)
 ISSN: 1551-7616
- P22.** *XPS study of 2H-TPP at Fe/Si(111) system*
 C Lal, IP Jain, G Di Santo, M Caputo, M Panighel, BA Taleatu, A Goldoni
 AIP Conference Proceedings 1512, 696 (2013) [10.1063/1.4791228](https://doi.org/10.1063/1.4791228)
 ISSN: 1551-7616

- P23.** *Review of 2H-tetraphenylporphyrins metalation in ultra-high vacuum on metal surfaces*
 M Panighel, G Di Santo, M Caputo, A Goldoni
 Journal of Physics: Conference Series 470, 012012 (2013) [10.1088/1742-6596/470/1/012012](https://doi.org/10.1088/1742-6596/470/1/012012)
 ISSN: 1742-6596
 Role: Responsible of XPS and NEXAFS experiments and related data analysis.
- P24.** *Experimental Study of Pristine and Alkali Metal Doped Picene Layers: Confirmation of the Insulating Phase in Multilayer Doped Compounds*
 M Caputo, G Di Santo, P Parisse, L Petaccia, L Floreano, A Verdini, M Panighel, C Struzzi, B Taleatu, C Lal, A Goldoni
 Journal of Physycal Chemistry C 116, 19902 (2012) [10.1021/jp306640z](https://doi.org/10.1021/jp306640z)
 Impact Factor: 4.814, ISSN: 1932-7447
- P25.** *Layer-dependent Debye temperature and thermal expansion of Ru(0001) by means of high-energy resolution core-level photoelectron spectroscopy*
 E Ferrari, L Galli, E Miniussi, M Morri, M Panighel, M Ricci, P Lacovig, S Lizzit, A Baraldi
 Physycal Review B 82, 195420 (2010) [10.1103/PhysRevB.82.195420](https://doi.org/10.1103/PhysRevB.82.195420)
 Impact Factor: 3.774, ISSN: 1098-0121
 Role: Participation in XPS measurements. Responsible for data analysis.

Conferences and seminars

- C1.** *High-quality N doped graphene layers: "inside out" growth and reactivity*
 Event: Graphene 2020, online, 21/10/2020
 Contribution: Oral communication
 Reference: <http://www.grapheneconf.com/2020/program.php>
- C2.** *N-doped graphene: growth and reactivity*
 Event: Chem2DMat, Dresden (Germany), 03/09/2019
 Contribution: Oral communication
 Reference: <http://www.chem2dmatconf.org/2019/>
- C3.** *Dynamical processes at surfaces imaged by STM on the millisecond time scale: the FAST module*
 Event: Materials 2018, Bologna (Italy), 25/10/2018
 Contribution: Oral communication
 Reference: Certificate released by Prof. Ezio Puppini on behalf of the organizing committee, <https://eventi.cnism.it/materials2018/submission/calendar>
- C4.** *The FAST module, an add-on unit to drive scanning probe microscopes to video rate and beyond*
 Event: International conference on novel 2D materials (2DSPM), Donostia-San Sebastian (Spain), 25/06/2018
 Contribution: Poster communication
 Reference: Certificate released by Miguel M. Ugeda and Ivan Brihuega Alvarez on 29/06/2018, http://2dspm.dipc.org/images/2DSPM_Book%20Abstracts.pdf
- C5.** *The FAST module, an add-on unit to drive scanning probe microscopes to video rate and beyond*
 Event: FisMat 2017, Trieste (Italy), 03/10/2017
 Contribution: Oral communication
 Reference: Certificate released by Prof. Ezio Puppini as conference chairman, <http://eventi.cnism.it/fismat2017/submission/calendar>
- C6.** *Effect of functional groups on the formation and self-assembly of graphene nano-ribbons*
 Event: Fuerzas y Túnel 2016 International Conference, Girona (Spain), 05/10/2016

- Contribution:* Poster communication
Reference: Certificate signed by Dr. Neus Domingo (Organizing Committee),
<http://fyt2016.icn2.cat/pdf/FyT-book-of-abstracts-final-190816.pdf>
- C7.** *Effect of functional groups on the formation and self-assembly of graphene nano-ribbons*
Event: On-Surface Synthesis International Workshop (OSS 16), San Sebastian (Spain), 27/06/2016
Contribution: Poster communication
Reference: Certificate released by Vincente Gascon Gascon (Academic secretary of the Summer Courses of the University of the Basque Country), http://oss.dipc.org/images/Program_OSS16.pdf
- C8.** *Magnetic properties of tetra-phenyl-porphyrins adsorbed on metal surfaces*
Event: 31st European Conference on Surface Science (ECOSS), Barcelona (Spain), 31/08/2015
Contribution: Oral communication
Reference: http://www.barcelocongresos.com.es/archivo/2015ecoss/img/Book_abstracts.pdf
- C9.** *Magnetic properties of tetra-phenyl-porphyrins adsorbed on metal surfaces*
Event: 20th International Conference on Magnetism, Barcelona (Spain), 05/07/2015
Contribution: Poster communication
Reference: <http://www.icm2015.org/abstracts.pdf>
- C10.** *Magnetic properties of metal-porphyrins adsorbed on ferromagnetic substrates*
Event: 2nd International Workshop on Surfaces Interfaces and Functionalization Processes in Organic Compounds and Applications (SINFO), Trieste (Italy), 25/06/2014
Contribution: Oral communication
Reference: Certificate signed by Prof. Alberto Morgante (CNR-IOM Director).
<http://organics2014.spin.cnr.it/SINFO2014programme.pdf>
- C11.** *Tunnelling and photoemission spectroscopy of metal-organic molecules on metallic substrates*
Event: 4th Young Researcher Meeting, Trieste (Italy), 03/06/2013
Contribution: Oral communication
Reference: Certificate signed by Prof. Carlo Baccigalupi (on behalf of the Organizing Committee) on 04/06/2013. <http://www.yrmm.it/drupal/?q=content/2013-Trieste/yrmm-2013-program>
- C12.** *Photoemission and Scanning Tunnelling Microscopy of Metal-Organic Molecules on metallic substrates*
Event: International Conference on Supramolecular Functional Systems for Organic Electronics, Strasbourg (France), 26/06/2013
Contribution: Poster communication
Reference: <http://www.superior-network.eu/conference>
- C13.** *Tunnelling and photoemission spectroscopy of metal-organic molecules on metallic substrates*
Event: 6th International Conference on Molecular Electronics (ElecMol 12), Grenoble (France), 02/12/2012
Contribution: Poster communication
Reference: Hard copy certificate
- C14.** *Adsorption, metalation and magnetic properties of tetra phenyl porphyrins adsorbed on metal surfaces*
Event: 2nd Joint Summer School on Nanotechnology, University of Udine (Italy), 02/07/2012
Contribution: Poster communication
Reference: Certificate signed by Prof. Luca Selmi (School Coordinator, University of Udine) on 05/07/2012.

Other titles and awards

- Winner of the “Best image voted by public” price during FyT2016 SPM Image contest, September 2016, Girona (Spain)
Reference: Hard copy certificate, <http://fyt2016.icn2.cat>
- Nanoporous graphene molecule of publication **P11.** has been awarded with the “Best Molecule of the Year 2018” price.
- Nanoporous graphene (publication **P11.**) has been candidate for the “Premio Vanguardia de la Ciencia”.

Language skills

- **Italian** mother-tongue
- **English** C1 level
- **Spanish** C1 level

Information technology skills

- **Operating systems** Linux, Windows
- **Programming languages** Python, C, LabVIEW

Trieste, 12 December 2020
Mirco Panighel