

## PERSONAL INFORMATION

**Antonio Massimiliano Mio** <https://www.imm.cnr.it/users/amio>

Nationality Italian

SELECTED  
WORK EXPERIENCEfrom November 2019  
to present**Permanent Staff Reasercher**

Istituto Microelettronica e Microsistemi - CNR. Zona industriale, strada VIII, 5 – 95121 Catania

- Research (microelectronics and micro-systems)
- Materials Fabrication and Characterisation, probe-corrected (S)TEM, EELS, EDX, TEM Lamella fabrication, Data Analysis)
- chalcogenide materials for PC-RAM – semiconductor nano structures, 2D-materials

**Business or sector** Researchfrom September 2018  
to November 2019**PostDoc Fellow**

Istituto Microelettronica e Microsistemi - CNR. Zona industriale, strada VIII, 5 – 95121 Catania

- Research (microelectronics and micro-systems)
- Materials Fabrication and Characterisation, probe-corrected (S)TEM, EELS, EDX, TEM Lamella fabrication, Data Analysis)
- chalcogenide materials for PC-RAM – semiconductor nano structures, 2D-materials

**Business or sector** Researchfrom September 2016  
To November 2019**Permanent Staff Teacher in Physics (ended in 2019)**

MIUR, IPSSS Galvani-Iodi Reggio Emilia

- Teaching, managing, programming, education, didactics, pedagogy

**Business or sector** Educationfrom June 2016  
to September 2017**Researcher**

RWTH Aachen University, I.Physikalisches Institut IA, Sommerfeldstraße 14, Turm 28, 52074 Aachen - GERMANY

- Research – Phase-Change Materials, Semiconductors and Materials Science
- Materials Fabrication and Characterisation, image-corrected and probe-corrected (S)TEM, EELS, EDX, sputtering deposition, TEM Lamella fabrication by conventional preparation and Focused Ion Beam

**Business or sector** Research

from January 2015  
To May 2016

## PostDoc Fellow

Istituto Microelettronica e Microsistemi - CNR. Zona industriale, strada VIII, 5 – 95121 Catania

- Research (microelectronics and micro-systems)
  - Materials Fabrication and Characterisation, probe-corrected (S)TEM, EELS, EDX, TEM Lamella fabrication, Data Analysis)
  - chalcogenide materials for PC-RAM – semiconductor nano structures, 2D-materials
- Business or sector** Research

## SELECTED

## EDUCATION AND TRAINING

from November 2012  
to December 2014

## Scholarship

Istituto Microelettronica e Microsistemi - CNR. Zona industriale, strada VIII, 5 – 95121 Catania

- Training to obtain “highly-qualified researcher in material science and technologies applied to nano scale” in the project “BeyondNano”. Advanced Electron Microscopy lecture: Theory and Practise. Probe-corrected (S)TEM, EELS, EDX, Electron Diffraction. crystallography, defects, atomic-scale Z-contrast microscopy (Cs-corrected), quantitative analysis at atomic scale, (S)TEM simulations, fabrication and characterization of 2D-materials, electron holography, characterization of nanostructure and nano-devices, TEM imaging of magnetic materials and fields, Cathodoluminescence

from November 2008  
to February 2012

## Ph. D. in Physics, summa cum laude

EQF level 8

University of Catania and Istituto Microelettronica e Microsistemi – CNR

- “Crystallization of Amorphous Chalcogenide Nano-Regions and Test-Structure Fabrication for Non-Volatile Memories”
- Electron Microscopy. Fabrication and characterization of phase-change memory devices by electron-beam lithography and photo lithography. Fabrication and characterization of SiN-based micro Cantilevers

from October 2005  
to May 2009

## Diploma di Licenza di Secondo Livello” - Second Level

Degree of Scuola Superiore di Catania (SSC\*) summa cum laude (first-class honours)

Scuola Superiore di Catania (SSC - Institute for Advanced Studies of University of Catania)

- “Ultralight cold quantum mirror”
- Structure of Matter, Semiconductors, Optics, Material Science, Computer Science, Numerical Analysis and Methods, Statistics, Laser, Spectroscopy, Bose-Einstein Condensation

from May 2008  
to October 2008

## Scholarship

European Laboratory for Non-linear Spectroscopy (LENS) - Sesto Fiorentino (FI) - Italy

- - Development of an ultra-stable tunable 6.8 GHz source to produce side-bands in a laser system
- - Research (Laser, spectroscopy, Bose-Einstein Condensation)

from October 2005  
to July 2008

## Master's Degree in Physics, summa cum laude (first-class honours)

EQF level 7

Department of Physics – University of Catania

- “6.6 GHz direct modulation of a laser diode for atomic cooling”
- Structure of Matter, Semiconductors, Optics, Material Science, Computer Science, Numerical Analysis and Methods, Statistics, Laser, Spectroscopy, Bose-Einstein Condensation

from September 2002  
to October 2006

## Diploma di Licenza di Primo Livello” – First Level Degree of Scuola Superiore di Catania (SSC\*) summa cum laude (first-class honours)

Scuola Superiore di Catania (SSC - Institute for Advanced Studies of University of Catania)

- “Majorana Spin-Flip in magnetic microtraps”
- Structure of Matter, Optics, Computer Science, Numerical Analysis and Methods, Statistics, Laser, Spectroscopy, Bose-Einstein Condensation

from September 2002  
to November 2005

## Bachelor's Degree in Physics, summa cum laude (first-class honours)

EQF level 6

Department of Physics – University of Catania

- - “Mossbauer Spectroscopy in Iron and Steel”
- - Structure of Matter, Optics, Computer Science, Numerical Analysis and Methods, Statistics

### LANGUAGES

Mother tongue(s)

Italian

Other language(s)

English

| UNDERSTANDING |         | SPEAKING           |                   | WRITING |
|---------------|---------|--------------------|-------------------|---------|
| Listening     | Reading | Spoken interaction | Spoken production |         |
| C1            | C1      | C1                 | C1                | C1      |

### METRICS OVERVIEW

H-index: 19 (scopus)

Citations: 1042

Documents: 65

Orcid ID: <https://orcid.org/0000-0002-8280-5413>

- Scopus ID: 36155381000

### SELECTED PUBLICATIONS

1. **Metal - Insulator Transition Driven by Vacancy Ordering in GeSbTe Phase Change Materials**, V. Bragaglia, F. Arciprete, W. Zhang, **A. Mio**, E. Zallo, K. Perumal, A. Giussani, S. Cecchi, J. Boschker, H. Riechert, S. Privitera, E. Rimini, R. Mazzarello, R. Calarco, *Sci. Rep.* **6**, 23843 (2016)
2. **Chemical and structural arrangement of the trigonal phase in GeSbTe thin films**, **A. M Mio**, S. MS Privitera, V. Bragaglia, F. Arciprete, C. Bongiorno, R.

- Calarco, E. Rimini, Nanotechnology **28**, 065706 (2017)
3. **Black Phosphorus/Palladium Nanohybrid: Unraveling the Nature of P-Pd Interaction and Application in Selective Hydrogenation**, M. Vanni, M. Serrano-Ruiz, F. Telesio, S. Heun, M. Banchelli, P. Matteini, **A.M. Mio**, G. Nicotra, C. Spinella, S. Caporali, A. Giaccherini, F. D'Acapito, M. Caporali and M. Peruzzini, Chem. Mater., 31, 5075–5080 (2019)
  4. **Impact of Bonding on the Stacking Defects in Layered Chalcogenides**, **Mio A.M.**, Konze P.M., Meledin A., Küpers M., Pohlmann M., Kaminski M., Dronskowski R., Mayer J., Wuttig M., Adv. Funct. Mater. 29, 1902332 (2019)
  5. **Sustainable Liquid-Phase Exfoliation of Layered Materials with Nontoxic Polarclean Solvent**, V. Paolucci, G. D'Olimpio, L. Lozzi, **A.M. Mio**, L. Ottaviano, M. Nardone, G. Nicotra, P. Le-Cornec, C. Cantalini, and A. Politano, ACS Sustainable Chem. Eng. 2020, 8, 18830–18840 (2020)

## JOB RELATED SKILLS

– Materials Fabrication and Characterization: Probe-corrected (S)TEM, EELS, EDX, sputtering deposition, ion implantation, laser irradiation, Electron Beam Lithography (EBL), photo lithography, Rutherford Backscattering Spectrometry (RBS), Scanning Electron Microscopy (SEM), X-ray diffraction, Electrical Measurements).

- Advanced knowledge of atomic spectroscopy instruments (laser systems, spectroscopy systems, Ultra High Vacuum (UHV) systems, etc.) Advanced knowledge of generic laboratory equipments (fast oscilloscopes, Reflectivity measurement system, four probes electrical measurements, spectrum analyzers, function generators, RF and high-frequency sources, Discrete Circuit Electronics, Microcontrollers, ecc.)

## DIGITAL SKILLS

Advanced knowledge of MAC OS, Microsoft Windows OS, Microsoft Office, AutoDesk AutoCAD, data analysis programs (python, R, Matlab, origin pro), web-oriented languages (html, php, asp, javascript), database management (mysql), NI-Labview, Unix/Linux based OS

## ADDITIONAL INFORMATION

- **Italian National Scientific Habilitation (ASN)** as associated professor in experimental Condensed Matter Physics (02/B1) - (<https://asn18.cineca.it/pubblco/miur/esito-abilitato/02%252FB1/2/3>)  
from January 2020 to January 2029
- **Teacher certification for Italian High School Mathematics and Physics**, from University of Catania, December 2013

I have presented the results of my works with oral contributions and proceedings, at several international conferences, such as **BeforeHand Symposium 2022**, **Materials Research Society (MRS) Spring Meeting**, in San Francisco (USA), 2010, 2011, 2012, 2014 and 2015, 2016, 2017, 2020, 2023, **European\ Phase Change and Ovonic Symposium** 2009, 2010 and 2015, Italian National Conference on Condensed Matter Physics 2013 and 2015, Conference of the Italian Physics Society (SIF) 2011, 2012, 2013 and 2014

I have also given lectures about Transmission Electron Microscopy and structural properties of alloys in specialist schools, such as “Phase Change Materials School 2022” (organized under the Horizon 2020 research and innovation programme “BeforeHand”,

grant agreement No 824957) and XIII SCUOLA DI RICERCA EDUCATIVA E DIDATTICA CHIMICA "ULDERICO SEGRE" in 2021.

I was Guest Editor in the Special Issue "Fundamentals of phase-change materials: Synthesis, characterization, devices and modeling" (2022) for Materials Science in Semiconductor Processing (Elsevier) <https://doi.org/10.1016/j.mssp.2021.106315>

I have also attended the following international schools:

- International School of Physics and Technology of Matter - CNR, Otranto (Italy), from 15/09/2014 to 19/09/2014.
- 1st Italian EELS School - electron energy-loss spectroscopy. IMM-CNR, Catania (Italy), from 26/05/2014 to 29/05/2014.
- WIEN2013 Workshop - HANDS ON WORKSHOP ON THE WIEN2K PACKAGE- The Pennsylvania State University in State College, Pennsylvania, from 12/08/2013 to 16/08/2013.
- 47th Course of the International School of Solid State Physics on Materials for Renewable Energy" - Erice, Italy, from 27/05/2010 to 3/06/2010.

## SELECTED PROJECTS

- **PNRR Ecosistema dell'Innovazione "SAMOTHRACE"** (as Partecipant) "Sicilian MicronanoTech Research And Innovation Center", dates: 10/2022 —>
- **PRIN2020 n. 20203K2T7F\_002 Project** (as Partecipant) "NEuroMorPHic devices bASed on chalcogenIde heteroStructures (EMPHASIS)", (PI: Prof. Riccardo Mazzarello) dates: 03/2022 —>
- **ESTEEM3 Project (H2020 G.A. N. 823717)** —(as Partecipant) 28/11/2019 —>
- **TEM Proposal (as Proponent, Internal Ernst Ruska-Centrum Proposal, ID: C-082, 2017) at Ernst Ruska-Centrum (ER-C)** für Mikroskopie und Spektroskopie mit Elektronen - Forschungszentrum Jülich GmbH 52425 Jülich, developing the topic "Nanoscale characterisation of crystalline phase-change materials for novel applications" — 24/01/2017 -> 31/08/2017
- **Beyond—Nano Project** (as Scholarship holder) on "Materials and processes BEYOND the NANO scale" (scientific supervisor: Dr. Corrado Spinella) - 05/11/2012 —> 31/12/2014
- **PRIN n. 2008YM2HR5\_004 Project** (as Ph.D. Student) "Study of amorphous-crystal transition in Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub>, GeTe e InGeTe<sub>2</sub> alloys", (PI: Prof. Andrea Leonardo Lacaita) dates: 22/03/2010 —> 22/09/2012