

# ALEX BOSCHI



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## Research Positions

Jul 22 – Dec 25

### *Post-doc Research Fellow*

Center for Nanotechnology Innovation - IIT (CNI-IIT), Pisa, Italy

Group PI: Dott. C. Coletti

Activities:

- Assembly of 2D material hetero-stacks and their characterization;
- Microfabrication of optoelectronic devices for telecom applications: scalable graphene-based photodetectors and frequency mixers operating at sub-THz frequencies and integrated on photonic platforms;
- Low-temperature magneto-transport studies of novel twisted multi-layer graphene systems.

Apr 21 – Apr 22

### *Post-doc Research Fellow*

Institute of Organic Synthesis and Photoreactivity (CNR-ISOF), Bologna, Italy

Group PI: Dott. V. Palermo – Supervisor: Dott. A. Candini

Activities:

- Optical and spectroscopic investigation of pseudorotaxanes complexation in solid states;
- Electrical measurements at the nanoscale of different organic compounds and nanofibers by scanning probe techniques;
- Integration of photochromic molecules in liquid-gated field effect transistors and their electrical characterization.

Dec 17 – Mar 21

### *Doctoral Research Fellow*

Institute of Organic Synthesis and Photoreactivity (CNR-ISOF), Bologna, Italy

Group PI/ Supervisor: Dott. V. Palermo

Activities:

- Charge transport studies in 2D material-based thin films: electrical measurements as a function of temperature and of magnetic field;
- Thin films fabrication by different solution-based deposition techniques (“drop-casting”, “spin-coating”, “filtration”, “blade-coating”)
- X-ray Photoelectron Spectroscopy (XPS) measurements of graphene-based materials and of materials for electronics;
- Atomic Force Microscopy (AFM) characterization of different nanostructured materials;
- Electrical characterization of graphite nanoplatelets-filled polymer composites;

Mar 17 – Sept 17      *Research Intern*

Laboratoire d'Innovation en Chimie des Surfaces et Nanosciences (LICSEN),  
CEA-Saclay, France

Group PI: Dott. V. Derycke – Supervisor: Prof. A. Filoromo

Activities:

- Full fabrication of field-effect transistors based on a carbon-nanotube network;
- Electrical and optoelectronic (*i.e.* electroluminescence and photocurrent measurements) characterization of aforementioned devices;
- Optoelectronic characterization of aforementioned devices coupled with silicon-on-insulator waveguides.

## Education

Nov 17 – Apr 21      *PhD in Physics and Nanosciences*

University of Modena and Reggio Emilia, Italy

Thesis: “*Investigation of charge transport in graphene-related materials (GRMs) thin films.*”

Sept 16 – Sept 17      *Master 2 in Nanosciences (\*)*

Université Paris-Saclay, France

Finale grade: 15.69 /20

Studied topics: Molecular Electronics, Nano- and Micro-fabrication, Scanning Probe Microscopy and Spectroscopy, Nanophotonics, Thin Film Photovoltaics.

(\*) *Double-degree* program

Oct 15 – Sept 17      *Master's Degree in Physics*

University of Ferrara, Italy

Thesis: "Electroluminescence and photoconductivity studies in carbon nanotube-based devices."

Finale grade: 110 /110 with honors

Studied topics: Solid State Physics, Surface Physics, Electron Microscopy, Silicon Micro-electronics, Magnetic Materials Properties

Sept 12 – Sept 15      *Bachelor of Science in Physics*

University of Bologna, Italy

Finale grade: 110 /110

Studied topics: Classical Physics, Basic and Advanced Calculus, Data Acquisition and Coding, Electronics, Quantum Mechanics

Sept 08 – Jul 12      *High-School Diploma in Applied Mechanics*

I.T.I "Belluzzi-Fioravanti", Bologna, Italy

Finale grade: 100 /100

Studied topics: Applied Mechanics of Solids and Fluids, Technology of Materials, Technical Design and CAD drawing

## Published Works

- "Built-in Bernal gap in large-angle-twisted monolayer-bilayer graphene";  
A. Boschi, Z. M. Gebeyehu, S. Slizovskiy, V. Mišeikis, S. Forti, A. Rossi, K. Watanabe, T. Taniguchi, F. Beltram, V. I. Fal'ko, C. Coletti, S. Pezzini;  
*Commun. Phys.* **7**, 391 (2024), [www.doi.org/10.1038/s42005-024-01887-0](http://www.doi.org/10.1038/s42005-024-01887-0)
- "Decoupled High-Mobility Graphene on Cu (111)/Sapphire via Chemical Vapor Deposition";  
Z. M. Gebeyehu, V. Mišeikis, S. Forti, A. Rossi, N. Mishra, A. Boschi, Y. P. Ivanov, L. Martini, M. W. Ochapski, G. Piccinini, K. Watanabe, T. Taniguchi, G. Divitini, F. Beltram, S. Pezzini, C. Coletti;  
*Adv. Mat.* **36**, 44, 2404590 (2023), [www.doi.org/10.1002/adma.202404590](http://www.doi.org/10.1002/adma.202404590)
- "Insight on the Intracellular Supramolecular Assembly of DTTO: A Peculiar Example of Cell-Driven Polymorphism";  
L. Aloisio, M. Moschetta, A. Boschi, A. García Fleitas, M. Zangoli, I. Venturino, V. Vurro, A. Magni, R. Mazzaro, V. Morandi, A. Candini, C. D'Andrea, G. M. Paternò, M. Gazzano, G. Lanzani, F. Di Maria;  
*Adv. Mat.* **35**, 42, 2302756 (2023), [www.doi.org/10.1002/adma.202302756](http://www.doi.org/10.1002/adma.202302756)

- “Mesoscopic 3D charge transport in solution-processed graphene-based thin films: a multiscale analysis.”;  
A. Boschi, A. Kovtun, F. Liscio, Z. Xia, K.H. Kim, S. Lara Avila, S. De Simone, V. Mussi, C. Barone, S. Pagano, M. Gobbi, P. Samorì, M. Affronte, A. Candini, V. Palermo, A. Liscio;  
*Small*, 2303238 (2023), [www.doi.org/10.1002/smll.202303238](http://www.doi.org/10.1002/smll.202303238)
- “Graphene oxide nanosheets for drinking water purification by tandem adsorption and microfiltration”;  
S. Khalifa, A. Bianchi, A. Kovtun, F. Tunioli, A. Boschi, M. Zambianchi, D. Paci, L. Bocchi, S. Valsecchi, S. Polesello, A. Liscio, M. Bergamini, M. Brunetti, M. L. Navacchia, V. Palermo, M. Melucci;  
*Sep. and Pur. Tech.* **300**, 121826 (2022), [www.doi.org/10.1016/j.seppur.2022.121826](http://www.doi.org/10.1016/j.seppur.2022.121826)
- “Multimodal sensing in rewritable, data matrix azobenzene-based devices”;  
A. Boschi, S. Cinili, G. Ruani, E. Bystrenova, J. Groppi, A. Credi, M. Baroncini, A. Candini, D. Gentili, M. Cavallini;  
*J. Mater. Chem. C* **10**, 10132 (2022), [www.doi.org/10.1039/D2TC01565J](http://www.doi.org/10.1039/D2TC01565J)
- “Push-pull thiophene-based small molecules with donor and acceptor units of varying strength for photovoltaic application: beyond P3HT and PCBM”;  
M. Marinelli, A. Candini, F. Monti, A. Boschi, M. Zangoli, E. Salatelli, F. Pierini, M. Lanzi, A. Zanelli, M. Gazzano, F. Di Maria;  
*J. Mater. Chem. C* **9**, 11216 (2021), [www.doi.org/10.1039/D1TC02641K](http://www.doi.org/10.1039/D1TC02641K)
- “Ultrafast charge carrier dynamics in Vanadium-modified TiO<sub>2</sub> thin films and its relation to their photoelectrocatalytic efficiency for water splitting”;  
A. Piccioni, D. Catone, A. Paladini, P. O’Keeffe, A. Boschi, A. Kovtun, M. Katsikini, F. Boscherini, and L. Pasquini;  
*J. Phys. Chem. C* **124**, 49, 26572 (2020), [www.doi.org/10.1021/acs.jpcc.0c06790](http://www.doi.org/10.1021/acs.jpcc.0c06790)
- “Benchmarking of graphene-based materials: real commercial products versus ideal graphene”;  
A. Kovtun, E. Treossi, N. Mirotta, A. Scidà, A. Liscio, M. Christian, F. Valorosi, A. Boschi, R. J. Young, C. Galiotis, I. A. Kinloch, V. Morandi, and V. Palermo;  
*2D Mater.* **6**, 025006 (2019), [www.doi.org/10.1088/2053-1583/aafc6e](http://www.doi.org/10.1088/2053-1583/aafc6e)

*Submitted/pre-print, not peer-reviewed*

- “*Phason-driven temperature-dependent transport in moiré graphene*”;  
A. Boschi, A. Ramos-Alonso, V. Mišekis, K. Watanabe, T. Taniguchi, F. Beltram, S. Forti, A. Rossi, C. Coletti, R. M. Fernandes, H. Ochoa, S. Pezzini;  
[www.doi.org/10.48550/arXiv.2511.01691](https://doi.org/10.48550/arXiv.2511.01691)

### Oral Contributions in Conferences

- “*Intrinsic Bernal gap in large-angle-twisted monolayer-bilayer graphene grown by CVD*”  
Conference: "Graphene Week 2025"; Sept 25 – Vicenza, Italy
- “*Charge transport mechanisms in GRM thin films: interplay between different length scales*”  
Conference: "Chem2Dmat"; Sept 21 – online
- “*Low temperature resistivity behaviour in GRM films: role of the vertical stacking order*”  
Conference: "FisMat 2019"; Oct 19 – Catania, Italy
- “*Benchmarking of Graphene-based materials: new standards for industry*”  
Conference: "Graphene Week 2019"; Sept 19 - Helsinki, Finland

### Poster Contributions in Conferences

- “*Observation of an intrinsic Bernal gap in large-angle-twisted monolayer-bilayer graphene grown by CVD*”  
Conference: "EMRS Spring Meeting 2025"; May 25 – Strasbourg, France
- “*Photobolometer based on high mobility graphene hetero-stacks as enabling technology for sub-THz wireless links*”  
Conference: "Graphene 2024"; Jun 24 – Madrid, Spain
- “*Optoelectronic, frequency mixer based on graphene hetero-stacks as enabling technology for sub-THz wireless links*”  
Summer school: "2D Quantum Matter"; Jul 23 – Lucca, Italy
- “*Preparation of graphene-based films with tuned structural and electrical properties*”  
Conference: "Materials.it 2018"; Oct 18 – Bologna, Italy

## Additional Activities

### *Training/ Supervision*

- Several users training in ISO6 cleanroom access and micro-fabrication equipment use (such as magnetron-sputterer, RIE, thermal evaporator, spin-coater, optical microscope); Mar 24 – Dec 25
- PhD student training in different deposition techniques and in measuring with scanning probe instruments; July 20 – Sept 21
- Graduate Fellow training in the use of an industrial laser for composite materials processing; Apr 21 – Jun 21

### *Academic teaching*

- Classical Physics Tutorials module (15h+40h) for Mechanical Engineering Degree Program, at University of Modena and of Reggio Emilia; Sept 21-Jan 22 (a.y. 21/22)
- Tutoring (40h) of Classical Physics Laboratory classes for Physics Degree Program, at University of Modena and of Reggio Emilia; Feb 19 – May 19 (a.y. 18/19)