

CURRICULUM VITAE



Name: Donato Civita

Date of birth: [REDACTED]

SUMMARY

Senior Postdoc researcher in **surface science** investigating **chemical processes on surfaces** and **two-dimensional systems**, including **2D polymerization** and **surface functionalization**, with extensive experience in the use of surface science techniques in particular **scanning tunnelling microscopy (STM)** in combination with **photoemission spectroscopy (XPS)**.

- Deep expertise of **single molecule investigation** via microscopy and spectroscopy with **STM at low and variable temperature**.
- Proven experience of **surface analysis with XPS** also with synchrotron radiation.
- Strong background in physics and mathematics, with proven **experience in academic teaching activities**.

PROFESSIONAL EXPERIENCE

- November 2024 – current: **Postdoctoral researcher** in the STRAS lab of the CNR-IOM institute at Elettra Synchrotron Trieste. Research fellowship financed by University of Trieste.

Synthesis and characterization of innovative two-dimensional materials. Study of their structural and electronic properties, and investigation of their impact on the reactivity of the surfaces. The scientific activity is conducted through investigation at the single-molecule scale with STM, and complemented by video-rate imaging with the “fast” electronics module. Moreover, the investigation of chemical composition and electronic structure is done by using XPS.

- June 2021 – April 2024: **Postdoctoral researcher** in the “Single Molecule Chemistry” research group of Prof. Leonhard Grill at the *University of Graz (Austria)*, in collaboration with the “Cluster Catalysis and Advanced Spectroscopy” group of Prof. Esch at the *Technical University of Munich (Germany)*.

Scientific project: “Connect-Catch-Couple: Metal-Molecule Interactions in Catalytic Coupling (CCC)” FWF (Austrian Science Fund) and DFG (German Research Foundation) joint project.

With this interdisciplinary project, we aimed to investigate cross-coupling reactions catalysed by palladium nanostructures, in solution and on surfaces, and compare them for a fundamental understanding of the underlying chemical processes.

By electron beam physical vapour deposition (PVD) I deposited nano-islands of palladium on a gold substrate to investigate their catalytic function in (cross-)coupling reactions. With the use of STM imaging, manipulation, and spectroscopy (at variable or liquid helium temperature) I investigate the fundamental details of these reactions.

TEACHING EXPERIENCE

- Sept. 2017 – Sept. 2019: **Supervisor** for the “Laborübungen aus Physikalischer Chemie” at the University of Graz. Experimental lab course for bachelor students of chemistry.

I guided the students in constructing a basic light diffraction setup, and supported them in the execution of simple spectroscopy experiments. I took care also of the correction of the reports, and engaged in discussions with the students regarding the results.

- Sept. 2019 – June 2020: Provided **support in grading** written physics exams for first-year undergraduate chemistry students at the University of Graz.
- Mar. 2022 – June 2022: **Instructor** for Ph.D. students in the use of the lab equipment.

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EDUCATION

- Oct. 2016 – May 2021: **Ph.D., Chemistry**, awarded by the *University of Graz (Austria)*.
Doctoral Thesis: “Reaction dynamics and controlled motion of single dibromo-terfluorene molecules on metal surfaces”.
With the doctoral research experience in the group of Prof. Grill, I gained profound knowledge of surface science, and a deep expertise in the investigation of molecular processes with STM. I conducted single bond dissociation experiments to unravel the dynamics of this fundamental process. Moreover, I investigated the controlled motion of a single molecule over very large distances (hundreds of nanometres) with picometre precision. Within this research scope, I led an expedition to the Oak Ridge National Laboratory (USA) to pioneer the utilization of a multi-probe STM, and transmit a single molecule between the two macroscopic probes of the STM.
- Sept. 2011 – September 2014: **M.S., Physics**, *University of Leiden (The Netherlands)*.
Master Thesis: “Towards Shot Noise Study of Hafnium Oxide Resistive Switching”.
Internship: In the group of prof. Ruitembek at the Leiden Institute of Physics I investigated electron transport phenomena in atomic scale conductors. Moreover, I gained expertise in the design and fabrication of nano-devices with e-beam lithography and sputter deposition in clean room facilities.
Internship: Physics of Life Processes research group, Leiden Institute of Physics.
Interdisciplinary research experience within a biophysics lab, investigating the biomechanical stretching of living cells, and imaging with optical and fluorescence microscopes.
- Sept. 2008 – Sept. 2011: **B.S., Physics**, *University of Padova (Italy)*.
Bachelor thesis: “Measurements for the Study of Mechanical Oscillators not in Thermodynamic Equilibrium”.
- 2003 – 2008: **Diploma of Mechanical Expert**, *Technical Institute "A. Einstein", Potenza (Italy)*.

PUBLICATIONS

- Civita, D., Timm, M., Schwarz, J., Hecht, S., & Grill, L. **Bond Dissociation Dynamics of Single Molecules on a Metal Surface**. *ACS Nano*, 19(10), 10255–10262 (2025).
<https://doi.org/10.1021/acsnano.4c17652>
- Nacci, C., Civita, D., Schied, M., Magnano, E., Nappini, S., Piš, I., & Grill, L. **Light-induced increase of the molecular coverage on a surface**. *J. Phys. Chem. C* 128, 14, 5919–5926 (2024).
<https://doi.org/10.1021/acs.jpcc.4c00559>
- Nacci, C., Schied, M., Civita, D., Magnano, E., Nappini, S., Piš, I., & Grill, L. **Thermal- vs Light-Induced On-Surface Polymerization**. *J. Phys. Chem. C* 125, 22554–22561 (2021).
<https://doi.org/10.1021/acs.jpcc.1c06914>
- Civita, D., Kolmer, M., Simpson, G. J., Li, A.-P., Hecht, S., & Grill, L. **Control of long-distance motion of single molecules on a surface**. *Science* 370, 957–960 (2020).
<https://doi.org/10.1126/science.abd0696>

SKILLS

- Strong experimental skills in **2D systems growth** and **surface characterization techniques**:
 - Complete knowledge of STM and AFM instrumentation, at variable and low temperature.
 - Strong experience with photoemission spectroscopy and surface analysis techniques (LEED, TDS)
 - Highly specialized in UHV preparation of metal single-crystal samples, and metals and molecules deposition techniques (PVD techniques, electrospray ionisation deposition).
- Extensive experience with **laboratory equipment**:
 - Vacuum technology and cryogenic cooling.
 - Cleanroom protocols.
 - Lab electronics (DAQ, I/V amplifier, lock-in amplifier)

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- **Mentoring and teaching skills**, developed through supervision of undergraduate and PhD students.
- **Assessment and feedback delivery skills**, acquired through grading written exams and correcting lab reports with attention to detail and fairness.
- **Transferable skills**:
 - Strong enthusiasm and independence in research management.
 - Large experience in producing **technical reports and writing scientific papers and proposals**.
 - Excellent communication and relational skills in international and interdisciplinary environments.
- **Data and images analysis and programming**: Python, Matlab, OriginLab, Gwyddion, Excel, Powerpoint.

CONFERENCES, WORKSHOPS, SCHOOLS

- **FisMat 2025, Venice**. (contributed talk).
- **Chem2DMat** European Conference on Chemistry of 2D materials 2021 and 2023, *Bologna and online*. (contributed talk and poster).
- **DPG** (German Physical Society) Spring Meeting Conference 2017-2024, *Dresden, Regensburg and Berlin*. (contributed talk or poster)
- **ÖPG** (Austrian Physical Society) Annual Meeting Conference 2018 and 2022, *Graz and Leoben (Austria)*. (contributed talk).
- **ULTIMATE** school "Self-Assembly on Surfaces and 2D Reactivity" 2020, *online*.

EXPERIENCES AS USER AT LARGE SCALE FACILITIES

- Jan. 2020: **BACH beamline, Elettra Synchrotron Trieste (Italy)**.
Perform XPS experiments to follow the evolution of light-induced on-surface polymerisation.
- Sept. 2019: **CNMS research group, Oak Ridge National Laboratory (USA)**.
Experimental study on the controlled motion of single molecules with multiprobe STM.
- Nov. 2018: **CEMES centre of the CNRS in Toulouse (France)**.
Exploring the use of a multi probe STM to control the motion of single molecules.

PROPOSALS

- Sept. 2023: **Marie Skłodowska-Curie Actions Postdoctoral Fellowships** with the supervision of Dr. Stefan Heun, research director of *Istituto Nanoscienze (CNR) in Pisa (Italy)*.
Title: "Fundamental understanding of Hydrogen Dissociation and Storage in bi-metallic two-dimensional metalorganic frameworks for future energy infrastructures"
Status: not funded.

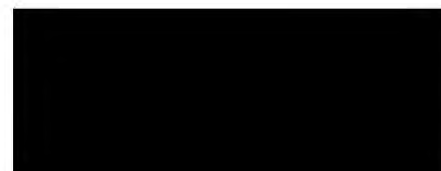
I conceived this project with the strong drive to apply my experimental expertise to a topic with direct implications for society and environment, namely the challenges related to hydrogen energy storage. Therefore, I developed an innovative approach to deeply understand the processes of hydrogen adsorption and dissociation on specific 2D materials (metal organic frameworks). My approach consists of using STM microscopy combined with other surface analysis techniques, aiming to provide insights for the design of more efficient and safer materials for hydrogen storage. I personally took care of drafting the proposal and managing the submission procedure.

PRIZES AND AWARDS

- Dec. 2020: Award for "*the outstanding achievements in the dissertation*" from the Institute of Chemistry of the University of Graz. The arrangement and actuation of the experimental work at the Oak Ridge National Laboratory (USA) large scale facility demonstrated a successful independent management of the research project.

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LANGUAGES

Italian: Native speaker.

English: Proficient both in written and spoken.

German: Upper intermediate.

Hungarian: Intermediate.

French: Beginner.

ADDITIONAL INTERESTS

Composing, recording music and live-performing.

REFERENCES

- **Prof. Dr. Leonhard Grill**, full professor of Physical Chemistry at the University of Graz (Austria) and leader of the Single Molecule Chemistry research group. leonhard.grill@uni-graz.at, +43 (0)316 380-5412
- **Dr. Grant J. Simpson**, senior scientist at the University of Graz in the Single Molecule Chemistry research group. grant.simpson@uni-graz.at, +43 (0)316 380-5511
- **Dr. Christophe Nacci**, research associate at the University of Graz in the Single Molecule Chemistry research group. christophe.nacci@uni-graz.at, +43 (0)316 380-5409
- **PD. Dr. Friedrich Esch**, Chair of Physical Chemistry at the Technical University of Munich (Germany) in the group of Cluster Catalysis and Advanced Spectroscopy. friedrich.esch@tum.de, +49 (89) 289 - 13286
- **Prof. Dr. Stefan Hecht**, Einstein Professor at Humboldt-Universität zu Berlin (Germany) and founding director of the Center for the Science of Materials Berlin. sh@hu-berlin.de, +49 (0)30 2093 82652
- **Dr. Stefan Heun**, research director of Istituto Nanoscienze (CNR) in Pisa (Italy) and head of the Scanning Probe Microscopy group. stefan.heun@nano.cnr.it, +39-050-509 472
- **Prof. Dr. Jan M. van Ruitenbeek**, professor of Experimental physics at the Leiden University (The Netherlands) and leader of the Atomic and Molecular Conductors research group. ruitenbeek@physics.leidenuniv.nl, +31 071 527 5450

Autorizzo il trattamento dei dati personali nelle modalità previste dal Regolamento UE 2016/679.

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