

Alessandro Cian

C u r r i c u l u m V i t a e

ORCID id: [0000-0003-3497-7066](https://orcid.org/0000-0003-3497-7066)

PROFESSIONAL SUMMARY

I am an experienced researcher, focused on the development and use of a wide range of lithographic platforms for sensing devices. From the start of my university career, I shaped my path through an experimental approach, which I continued to apply in my work after graduation.

I have worked in clean room environments and throughout the silicon process chain for more than eleven years. My areas of expertise include lithographic process development (e.g. UV, e-beam, ion-beam, laser and nanoimprint lithography) and its integration in micro- and nano-fabricated devices, for creating next-generation sensors at the SD Center of Fondazione Bruno Kessler. In its multi-user facility, I am leading lithography operations on silicon, quartz and diamond. I have recently been pursuing my research interest in silicon carbide-based processes, with the focus on the technological transfer towards new sensing applications.

During my career I have developed novel lithographic platforms but also supported external industrial partners in the development of their equipment and their applications. I supervised the development of an e-beam tool from the alpha stage to marketable status and intensively developed processes with an innovative system for nano-patterning with ion beams.

Thanks to my broad knowledge of microfabrication technologies, I also coordinate the front-end activities, ensuring process consistency and optimization across the cleanroom according to an ISO 9001-compliant quality system. Since the beginning of my career, I have been strongly committed to the training of early-career researchers and to technology transfer activities, to dissemination and practical application of advanced fabrication technologies.

CURRENT POSITION

Researcher

October 2019 – up to now

Fondazione Bruno Kessler
Center for Sensor & Devices
Trento - Italy

Photolithography: support on consolidated UV processes (with mask aligner and stepper tools), development and optimization of new processes for sensor integration from sample preparation to the integration in the process flow. Technology transfer activities and tutoring early-career researchers in lithography. Active member of the EuroNanoLab lithography group with general organization, organization and leading of workshops and benchmarking projects that compare and enhance lithographic capabilities among research facilities in Europe. Mentoring and supervising PhD students and early researchers in their activities.

Direct lithography: development and optimization of novel lithography processes (e-beam, ion beam and laser lithography) and integration for plasmonic, photonic and quantum applications. Involved in the development of equipment and processes in

collaboration with external industrial partners (TESCAN group and RAITH GmbH). Since 2021, active in the implementation of ion-beam technologies for quantum technologies.

Innovative materials and future technologies: use of lithographic platforms for advancing quantum technologies based on color centers in diamond. Exploration of deep UV lithographic equipment and processes for silicon and silicon carbide platforms, in alignment with the SD Center's strategic roadmap.

Characterisation: support for fabrication processes through characterisation (AFM, SEM, profilometer, FIB and PFIB) and circuit editing (FIB and PFIB) activities.

Management: supervision of the microfabrication activities (lithography from 2020, front-end from 2024) to ensure the quality standards of the cleanrooms and to support researchers and technicians in the development of new processes. Market survey activities, tender writing activities and installation and acceptance processes for new cleanroom equipment.

Quality: support the quality managing system to sustain the ISO 9001 certification, by monitoring the controls for SPCs and non-conformities and updating the front-end work instructions. Support on the development of the Laboratory Information Management System (LIMS) and to its implementation in the activities of the facility.

Communication: producing scientific outreach content and supporting communication activities for the Facility as a science ambassador for the SD Center. Responsible for the laboratory wiki website for user support, managing updates to the SD Center website. Dissemination activities such as workshops, seminars, laboratory visits and social media interactions aimed to the public, students and young researchers.

PREVIOUS POSITIONS

Nanofabrication engineer

Process optimization

September 2015 – October 2019

ThunderNIL s.r.l. c/o Area Science
Park
Trieste - Italy

Fabrication: micro and nano-fabrication processes for standard and non-standard thermal and UV nano-imprinting lithography for silicon master generation in research and industrial projects for biomedical sensors, micro-fluidics, micro-structured optical elements and anti-counterfeiting devices. Performing various micro and nano-fabrication processes: aligned UV lithography, laser interferometer lithography, plasma etching, wet etching, deposition by evaporator and sputter, e-beam and ion-beam lithography, thermal and UV nano-imprinting and pattern replica by PDMS and electroplating for micro-fluidics and roll-to-roll applications. Laboratory activities conducted in cleanroom environment from CNR-IOM (ISO 4 – 7). Lithography layout designing with k-layout software.

R&D: optimisation of pulsed-NIL lithography process, supporting

the development of this novel imprinting technology for pattern transfer on silicon, metals, plastic and other flexible materials. Mentoring and supervising master students and early researchers in their activities.

Characterisation: evaluation of micro and nano-fabrication processes through characterisation (SEM and FIB) activities.

Training: training of new staff entering the facility for working in a cleanroom environment and performing processes, e.g. lithography, wet etching, dry etching, characterisation with SEM and profilometers (from 2017).

Supervisor: responsible for overseeing daily operations, managing staff, assigning tasks, and monitoring the workflows (from 2017).

R&D internship

Process optimization

September 2015 – August 2016

ThunderNIL s.r.l. & Area Science

Park

Trieste – Italy

Activity: fabrication of electrochemical nano-sensors for biomedical diagnostic applications, micro-fuel cells and processing development for direct holographic labelling of plastic materials.

EDUCATION

Master's Degree in Microphysics and the Structure of Matter

EQF level 7

October 2011 – March 2015

University of Trieste & CNR-IOM laboratories

Trieste - Italy

In-depth study of advanced topics related to solid-state physics with a strong experimental focus. Development of practical and methodological skills thanks to the university's exceptionally rich network of laboratories and research centers.

Thesis (CNR-IOM, Trieste): "Nanofabrication and characterization methods of hybrid perovskite crystals for photovoltaic applications". (from 2014)

Activity: perovskite synthesis, patterned silicon moulds fabrication, development of patterning processes of this novel material

Bachelor Degree in Physics

EQF level 6

October 2007 – March 2011

University of Trieste
Trieste - Italy

Solid and thorough grounding in classical and modern physics, both theoretical and experimental. Particular attention was devoted to laboratory activities, which developed practical skills in the use of scientific instrumentation and experimental techniques.

COURSES AND TRAININGS

Quality management in production environments

June 2025 – on going

(until September 2025)

Course on Quality Management Systems (ISO 9001) with a focus on their role in improving research quality. Topics include quality management principles, key procedures and work instructions, internal audits, and management review processes.

TÜV SÜD & Fond. Bruno Kessler
Trento - Italy

Science Ambassador

September 2024 – February 2025

Feltrinelli Education, Scuola Holden
& Fond. Bruno Kessler
Trento - Italy

FBK Science Ambassador project, a high-level training course on science communication topics. In collaboration with Feltrinelli Education and Scuola Holden. Main workshops: *storytelling, social media and speaking*.

Transformational Leadership

February – March 2024

Motiviamo – Emanuela Chemolli
& Fondazione Bruno Kessler
Trento - Italy

Transformational Leadership course. Focused on the development of collaborative and distributed leadership skills within teams. Insight into tools and strategies to foster autonomy, shared responsibility and the enhancement of each staff member's contribution.

WORK SKILLS

Technical skills

- Strong expertise in working in ISO class 4-7 clean room environment (12 years)
 - FNF facility of CNR-IOM (2014)
 - FNF facility of CNR-IOM and ThunderNIL laboratories (2015-2019)
 - MNF facility of FBK-SD (2020-2025)
- Strong expertise in lithography (11 years):
 - UV lithography: patterning with mask aligner and stepper equipment
 - E-beam lithography: nanopatterning with e-beam (EBL), with mix & match approaches
 - Ion-beam lithography: nanopatterning with Au, Si and Ge focused ion-beams (IBL)
 - Laser lithography: micro and nanopatterning with UV laser (DWL), for silicon patterning and mask fabrication
 - Nanoimprinting: pattern transfer with thermal, UV and pulsed NIL processes
 - Ancillaries processes: sample cleaning, coating, developing, functionalization and thermal treatments
 - Layout designing for masks and reticles with CAD software (k-layout and L-EDIT)
- Expertise in DUV lithography and its applications:
 - krF-based processes (stepper exposure and resist processing)
 - Processing of silicon and silicon carbide
- Strong expertise in integration of nanostructures on microelectronic devices through processes of mix and match techniques
- Strong expertise in quantum applications with diamonds substrates,

integrating patterning strategies, ion implantation, post processing and activation procedures for color centers fabrication

- Strong expertise in pattern transfer through lift-off, dry etching with plasma and wet etching
- Strong expertise in pattern replica through molding (PET, PC and PDMS) and electroplating
- Strong expertise in characterisation techniques: AFM, SEM, FIB, Plasma-FIB for characterisation such as:
 - *Sample imaging for morphological and topographical information*
 - *Roughness and topography measurements*
 - *Cross-section fabrication and analysis by SEM and STEM*
 - Modification like circuit editing and gas induced depositions
- Wide expertise in other micro and nanofabrication techniques: thermal/e-beam evaporator, wet processes for cleaning and etching, sputtering, chemical vapor deposition processes, thermal processes for deposition, diffusion and material growth and ion implantation.

Other professional skills

- Expertise in cleanroom management for the front-end area of 3 cleanrooms (1300+ m²)
- Expertise in staff coordination (8+ years). Currently coordinator of 5 people for the lithography area (technical staff), and 29 people for the front-end area (researchers, technicians, maintainers and technologists)
- Expertise in supervising and mentoring early researchers, master and PhD students, supporting their research activities and professional development.
- Process and quality: supervisor for the ISO 9001 quality system for the facility, supervisor for non-conformance tracking and Statistical Process Control management. Strong activity in process control management through the Laboratory Information Management System (LIMS)
- Wide experience in new equipment acquisition with market analysis, tender procedures, installation and development of new technologies (Plasma-FIB, mask aligner, coater/developer, DWL, EBL, stepper)

PERSONAL SKILLS

Soft skills

- Skilled in planning, prioritizing, and delegating tasks effectively within teams
- Committed to continuous personal and professional development
- Adaptable and creative in problem-solving under changing conditions
- Trained in science communication, with a focus on storytelling, social media, and effective use of verbal and non-verbal language

Language(s)

- Mother tongue: *Italian*
- Other: *English (advanced), French (beginner)*

RESEARCH ACTIVITIES (selection of relevant entries)

Relevant research and Development Projects

- POC program at FBK for new ideas and startups (2026)
- POC program at FBK for new ideas and startups (2025)
- CHIPS JU project for SiC applications (from 2025)
- IPCEI ME/CT project for SiC applications and deep UV processes (from 2024)
- *Studi di sistemi e tecnologie quantistici* project from Agenzia Spaziale Italiana (submitted in 2024, waiting for review)
- Qu-pilot horizon-RIA project on diamond-based technologies (from 2023)
- PNRR nQSTI on diamond-based technologies (from 2022)
- DART WARS project for superconducting detectors (2021-24)
- Development of custom EBL lithographic tool with TESCANA Group (2020-23)
- R&D collaboration with RAITH GmbH on FIB tool (2019-23)
- IPCEI ME project for 3D integration activities (2019-23)
- Research internship granted by Area Science Park (2015)

Relevant contribution at conferences and workshops

- Lithography school: organization of a European workshop at INL (2026)
- MNE 2026: invited talk about ion beam lithography (2026)
- EU-FIB conference: oral on FIB strategies in color centers fabrication (2025)
- ENRIS conference: oral on Color centers in diamond (2025)
- ENL lithography workshop: organisation of FIB workshop and participation to process comparison between European research facilities (2024)
- FIT4NANO workshop: oral on selective etching induced by ion implantation (2024)
- SD Center workshop: 3 sessions about UV, EBL and FIB lithography (2024)

Relevant publications

Fabrication of Conductive Graphitic Layers in Diamond by Multispecies Focused Ion Beam

E. Scattolo, E. Missale, [A. Cian](#), M. Valt, S. Ferrari, R. Dell'Anna, D. Giubertoni, (2026), Physica Status Solidi (A) Applications and Materials Science 223(7). 2026 [10.1002/pssa.202500645]

High yield creation of germanium vacancy centers in diamond by focused ion beam implantation and high temperature annealing

S Dietel, E Scattolo, J Fuhrmann, L Kazak, [A. Cian](#), E Missale, D Giubertoni, F Jelezko, (2026), Materials for Quantum Technology 6(3). 2026 [10.1088/2633-4356/aea514]

Silicon selective etching by gold implantation: feasibility and nanofabrication

capabilities

E. Scattolo, [A. Cian](#), J. Llobet, X. Borrisé Nogue, S. Mondal, M. Barozzi, A. Bagolini, M. Crivellari, F. Pérez-Murano, D. Giubertoni, (2025), 100308, 2590-0072, [10.1016/j.mne.2025.100308]

Shallow Nitrogen Vacancy Color Centers in Diamond by Ion Implantation

G. Speranza, [A. Cian](#), B. P. Correa, E. Missale, A. Pedrielli, S. Piccolomo, A. Samusenko, E. Scattolo, D. Zanardo, R. Canteri, G. Pucker, A. Picciotto, R. Vollmer, R. Dell'Anna, D. Giubertoni, Adv Quantum Technol. (2025), e2500080. [10.1002/qute.202500080]

Integration of germanium-vacancy single photon emitters arrays in diamond nanopillars

E. Redolfi,, V. Pugliese, E. Scattolo, [A. Cian](#) et al., EPJ Quantum Technol. 12, 25 (2025). [10.1140/epjqt/s40507-025-00329-2]

Influence of Ultrasonic Bath on Mold-Assisted Electrodeposition of Gold Microelectrode Arrays

N. Yadav, F. Giacomozzi, [A. Cian](#), D. Giubertoni, L. Lorenzelli, (2024), Proceedings 2024, 97, 90 [10.3390/proceedings2024097090]

Imaging of Antiferroelectric Dark Modes in an Inverted Plasmonic Lattice

J. Rodríguez Álvarez, A. Labarta, J. C. Idrobo, R. Dell'Anna, [A. Cian](#), D. Giubertoni, X. Borrisé, A. Guerrero, F. Perez-Murano, A. Fraile Rodríguez, X. Batlle (2023), ACS Nano, 17, 9, 8123–8132 [10.1021/acsnano.2c11016]

Near Infrared Efficiency Enhancement of Silicon Photodiodes by Integration of Metal Nanostructures Supporting Surface Plasmon Polaritons

E. Scattolo, [A. Cian](#), L. Petti, P. Lugli, D. Giubertoni, G. Paternoster (2023), Sensors, 23(2), 856 [10.3390/s23020856]

Optimization of Focused Ion Beam Patterning Parameters for Direct Integration of Plasmonic Nanostructures on Silicon Photodiodes

E. Scattolo, [A. Cian](#), D. Giubertoni, G. Paternoster, L. Petti, P. Lugli (2021), doi.org/10.3390/ecsa-8-11259

Nanoelectrode Arrays Fabricated by Thermal Nanoimprint Lithography for Biosensing Application

A. Zanut, [A. Cian](#), N. Cefarin, A. Pozzato, M. Tormen, Biosensors (2020), 10(8), 90; DOI: 10.3390/bios10080090

Fast optical humidity sensor based on nanostructured hydrogels

S. Cesnik, A. M. Coclite, A. Perrotta, [A. Cian](#), M. Tormen, A. Bergmann, Proceedings Volume 11467, Nanoengineering: Fabrication, Properties, Optics, Thin Films, and Devices XVII; 114672K (2020); DOI: 10.1117/12.2568475

Nanostructuring methylammonium lead iodide perovskite by ultrafast nano imprinting lithography

N. Cefarin, [A. Cian](#), A. Sonato, E. Sovrnigo, F. Suran, Z. Teklu, A. Zanut, A. Pozzato, M. Tormen, Microeletronic Engineering 176, 106-110 (2017); DOI: 10.1016/j.mee.2017.02.023

Trento, October 15, 2026

