Curriculum vitae

## PERSONAL INFORMATION


# Cristian Collini

via Sommarive 18, 38123 Trento (Italy)


## Researcher

## WORK EXPERIENCE

01/2021-Present

### Researcher

**Microsystems Technology Group, Center for Materials and Microsystems, Fondazione Bruno Kessler (FBK), Trento (Italy).**

- Design and fabrication of innovative MEMS and Bio-MEMS sensor devices based on silicon compatible technology and 3D Printing.

01/2018-10/2019

### Researcher

**Silicon Sensor Technology, department of Microsystems and Nanotechnology, SINTEF, Oslo (Norway).**

- MEMS Expert for fabrication of innovative MEMS and Bio-MEMS sensor devices based on silicon compatible technology in a clean room with resolution to nanometers on 6” size silicon wafers.
- Developing semiautomated procedure of testing and characterizations - morphological & electrical
- Testing and characterization of fabricated devices by morphological analyses (SEM, Profilometers, imaging, etc.).

- Main activities:
  - Design and Fabrication of Inertial MEMS Gyrometer – zero level packaging, metrology, C-Soi. In the framework: MUPIA HORIZON 2020 Programme, Clean Sky II, Grant no. 785337. (https://www.sintef.no/mupia/)
  - Proposing new projects and co-writing proposals: eg. Project: MoleculAr harvesTing with electroporation, microfluidics and nanoparticles for dIagnoSticS and thErapy of heterogeneous solid tumours. (https://www.era-learn.eu/network-information/networks/euronanomed-iii/joint-transnational-call-2020/molecular-harvesting-with-electroporation-microfluidics-and-nanoparticles-for-diagnostics-and-therapy-of-heterogeneous-solid-tumours)
  - Acquisition and validation of morphological and geometrical data: eg. Gage R&R Study, ANOVA gauge R&R, etc.

06/2002-12/2018

### Researcher

**Microsystems Technology Group, Center for Materials and Microsystems,**

**Fondazione Bruno Kessler (FBK), Trento (Italy).**

- Design (with L-Edit tanner tools EDA) and fabrication of innovative MEMS and Bio-MEMS sensor devices based on silicon compatible technology in a clean room ISO 3/5 (class 10, 100, 1000) with resolution from micrometric to few hundred nanometers on 4" and 6" size silicon/quartz wafers.
- Testing of fabricated devices (RF – radio frequency) MEMS switches, integrated microphones, micro fabricated electrode arrays, microfluidic and flow sensors) by morphological analyses (SEM, Profilometers, imaging, etc.) and electrical testing.

- Main activities:
  - Evaluation of design rules and alignment markers for general microfabrication of devices
  - Design and measurement of test structures for quality control of microfabrication processes
  - Design and fabrication of Electrochemical sensors based on microelectrode structures, and arrays for neural networks study, microelectrode arrays for cell electroporation, voltammetry microelectrodes for agro food, biomedicine and environmental analyses
  - Design and fabrication of Flow sensors for space application (installed on Gaia satellite of ESA – European Space Agency) http://www.esa.int/Our_Activities/Space_Science/Gaia)
  - Design and fabrication of package, reservoirs, microfluidics by soft lithography and hot embossing with polymeric materials like COP (Cyclic Olefin Polymer), PDMS (Polydimethylsiloxane), SU8 (epoxy-based negative photoresist) and Quartz or Silicon
  - Implementation of CMOS technology for fabrication of Tactile sensors with piezoelectric materials poly[(vinylidenefluoride-co-trifluoroethylene] (PVDF TrFE)
  - Design and fabrication of memristive devices for adaptive electronics and neuroscience applications (http://www.bo.cnr.it/imem-old/Madelena/drupal-7.22/)
  - Development and implementation of technological steps for flexible devices on polymeric substrates, silicon and SOI (Silicon On Insulator) wafers.
  - Silicon Micro Nebulizer for domestic insecticide application for commercial partners (Zobele Group http://www.zobele.com/)
  - Design and fabrication of electronic interfaces for preliminary test and characterization of fabricated devices (e.g. flow sensors, RF-Micro-switch and Microphones)

03/2007–05/2007 **Teaching activity**

University of Trento, Trento (Italy)

- Teaching "bioelectronic systems" class to graduate students of "Master di Secondo Livello in Nano e MicroSistemi ElettroMeccanici (NEMS/MEMS)"
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01/2007 **Other research activity**

*Department of Industrial Engineering* , University of Trento, Trento (Italy) in collaboration with Prof.

Gian Franco Dalla Betta

- Development of technological steps for isotropic etching of quartz wafers to realize microfluidic part of optical and electrochemical sensors for biomedical applications

## EDUCATION AND TRAINING

12/2008–3/2011

### Ph.D. in Nanotechnology

University of Genova (Italy)

Thesis: "Study and development of new technologies for in-vitro cell analysis Microsystems"

09/1995–05/2002

### Master degree in Physics

University of Trento, Trento (Italy)

Thesis" Influence of charge in Silicon Nitride layers on the stability and performance of Ion Sensitive Effect Transistor sensor (Influenza della carica nel Nitruro di Silicio sulla stabilità della risposta di un sensore ISFET) "

06/2004

"2nd European School of Neuro-engineering "Massimo Grattarola"" Genova 9-12 June, 2004

Ph.D. in Nanotechnology

University of Genova (Italy)

Thesis: "Study and development of new technologies for in-vitro cell analysis Microsystems"

"2nd European School of Neuroingeneering "Massimo Grattarola"" Genova 9- 12 Giugno 2004

## PERSONAL SKILLS

Languages

Italian (mother tongue)

English (fluent)

Selected Publications

**Selected publication from a total of 29 journal papers, 82 conference papers/abstracts/posters and 1 patent. (** https://orcid.org/0000-0001-8975-0008**)**

- Guido Sordo, Cristian Collini, Sigurd Moe, and Daniel Nilsen Wright. Wafer bonding process for zero level vacuum packaging of MEMS. 2020 IEEE 8th Electronics System-Integration Technology Conference (ESTC), DOI: 10.1109/ESTC48849.2020.9229871
- Guido Sordo, Cristian Collini, Sigurd Moe, and Daniel Nilsen Wright. Through Silicon Vias in MEMS packaging, a review. NordPac 2019, URI: http://hdl.handle.net/11250/2637875
- Rangra, Kamaljit, Margesin, Benno, Lorenzelli, Leandro, Giacomozzi, Flavio, Collini, Cristian, Zen, Mario, Soncini, Giovanni, Laura del Tin, Roberto Gaddi (2005). Symmetric toggle switch—a new type of rf MEMS switch for telecommunication applications: Design and fabrication. SENSORS AND ACTUATORS. A, PHYSICAL, vol. 123-124, p. 505-514, ISSN: 0924-4247, doi: 10.1016/j.sna.2005.03.035
- Antonella Benvenuto, Guarnieri, Vittorio, Lorenzelli, Leandro, Collini, Cristian, Decarli, Massimiliano, Adami, Andrea, Potrich, Cristina, Lunelli, Lorenzo, Canteri, Roberto, Pederzolli, Cecilia (2008). Fabrication of a MEMS-based separation module for liquid chromatography. SENSORS AND ACTUATORS. B, CHEMICAL, vol. 130, p. 181-186, ISSN: 0925-4005, doi: 10.1016/j.snb.2007.07.111

- Cristian Collini, Elisa Morganti, Romina Cunaccia, Lara Odorizzi, Cristina Ress, Leandro Lorenzelli, Alessandro De Toni, Giorgio Marinaro, Mauro Borgo, M. Maschietto (2009). Fabrication and characterization of a fully integrated microdevice for in-vitro single cell assays. PROCEDIA ENGINEERING, vol. , ISSN: 1877-7058
- Ravinder S. Dahiya, D. Cattin, A. Adami, C. Collini, L. Barboni, M. Valle, L. Lorenzelli, R. Oboe, G. Metta, F. Brunetti (2011). Towards Tactile Sensing System on Chip for Robotic Applications. IEEE SENSORS JOURNAL, vol. XX, p. 1-11, ISSN: 1530-437X
- Mattia Marelli, Giorgio Divitini, Cristian Collini, Luca Ravagnan, Gabriele Corbelli, Cristian Ghisleri, Antonella Gianfelice, Cristina Lenardi, Paolo Milani, Leandro Lorenzelli (2011). Flexible and biocompatible microelectrode arrays fabricated by supersonic cluster beam deposition on SU-8. JOURNAL OF MICROMECHANICS AND MICROENGINEERING, ISSN: 0960-1317
- E. Morganti, C. Collini, R. Cunaccia, A. Gianfelice, L. Odorizzi, A. Adami, L. Lorenzelli, E. Jacchetti, A. Podestà, C. Lenardi, P. Milani (2011). A dielectrophoresis-based microdevice coated with ns-TiO2 for separation of particles and cells. MICROFLUIDICS AND NANOFLUIDICS, vol. 10, p. 1211-1221, ISSN: 1613-4982
- G Baldi, S Battistoni, G Attolini, M Bosi, C Collini, S Iannotta, L Lorenzelli, R Mosca, J S Ponraj, R Verucchi, V Erokhin (2014). Logic with memory: and gates made of organic and inorganic memristive devices. SEMICONDUCTOR SCIENCE AND TECHNOLOGY, vol. 29, ISSN: 0268-1242, doi: 10.1088/0268-1242/29/10/104009
- Prusakova V., Collini C., Nardi M., Tatti R., Lunelli L., Vanzetti L., Lorenzelli L., Baldi G., Chiappini A., Chiasera A., Ristic D., Verucchi R., Bortolotti M., Dirè S (2017). The development of sol-gel derived TiO2 thin films and corresponding memristor architectures. RSC ADVANCES, vol. 7, p. 1654-1663, ISSN: 2046-2069, doi: 10.1039/c6ra25618j
- Collini, Cristian, Antonella Benvenuto, Pedrotti, Severino, Lorenzelli, Leandro, Amedeo Masci, M. Ilie, L. Nardi, Roberto Pilloton (2007). Quartz-based multielectrode array for analytical diagnostics. In: The 8th workshop on biosensors and bioanalytical micro-Techniques in environmental and clinical analysis. Taylor & Francis, Goa, India, 03/10/2007 - 06/10/2007
- Biazi, Leonardo Artur, Collini, Cristian, Guarnieri, Vittorio, A. Lago, R. Marchiori, Gottardi, Gloria, Morganti, Elisa, Lorenzelli, Leandro (2009). Droplet and Dielectrophoresis deposition of single-wall carbon nanotubes. In: Proceedings of Nanotechnology 2009. IEEE-NANO 2009. p. 575-578, ISBN: 9781424448326, Genoa, Italy, 26-30 July 2009
- Collini, Cristian, Morganti, Elisa, Odorizzi, Lara, Ress, Cristina, Lorenzelli, Leandro, Coppedè, Nicola, A. B. Alabi, Iannotta, Salvatore, L. Vidalino, P. Macchi (2010). FUNCTIONALIZED MICROELECTRODES ARRAYS WITH INTEGRATED MICROFLUIDIC CHANNELS FOR SINGLE-SITE MULTIPLE TRANSFECTIONS. In: Atti GNB 2010, Secondo Congresso Nazionale di Bioingegneria. Torino, 8-10/07/2010

Organisational / managerial skills

- Establishment of interpersonal links and team work (in multi-cultural and international environments);
- Management and coordination of the working team, effort optimization in light of the expected objectives;
- Flexibility and fast familiarization with new work environments;
- Strongly oriented to reach the expected results through the exercise of problem solving, time and priorities management, as well as through risk management (i.e. definition/actuation of mitigation and contingency plans);
- Curious and willing to acquire new competences, even if not strictly related to the main area of interest.

Job-related skills

**TECHNICAL EXPERIENCE**

• **Instrumentation**

Optical profilometers ( Leica, Zygo)

Mechanical profilometer (KLA-Tencor)

Electron beam evaporator (Ulvac EBX-16C with e-gun Ferrotec EV S-6)

Wafer bonding (AML, EVG, Suss)

Scanning electron microscopy (Tescan, QuantaFEI)

Plasma etching (Tegal, Matrix , Tepla)

Electrical multi parametric testing

Manual mask aligner Suss MicroTec MA/BA 6

• **Benchwork**

Wet isotropic and anisotropic etching (TMAH)

Vapor HF etching technology

• **Software**

Layout design software: L-Edit, Tanner EDA, Mentor Graphics

Data acquisition software and Data analysis software (Origin, LabView, Igor, excel, aixplorer, Python, etc.)