

Valentina Bello

Curriculum Vitae

Short Biography and General Information

E-mail valentina.bello@unipv.it

address

Date and April 24th 1994, 15057 Tortona (AL), Italy

place of birth

Nationality Italian

Website https://labeo.unipv.it/wordpress/people/valentina-bello/LinkedIn https://www.linkedin.com/in/valentina-bello-890a28b3

Google https://scholar.google.com/citations?user=IP8lxEoAAAAJ&hl=en

Scholar

Scopus profile https://www.scopus.com/authid/detail.uri?authorld=57225306166#

Scopus ID 57225306166

ORCID ID https://orcid.org/0000-0003-3231-0604

Web of JBR-9842-2023

Science

ResearcherID

Present position

August 2023 Assistant Professor (Italian position of RTDa). SSD: ING-INF/07 Misure elettriche ed elettroniche. Laboratory of ElectroOptics, Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy

Experience

May 2023 Visiting Lecturer, teaching the short course titles "Optofluidic sensing technologies: innovative detection techniques and smart solutions for real world applications" at the SPIM (Sciences Physiques pour l'Ingénieur et Microtechniques) Doctoral School of the University of Bourgogne Franche-Comté, Besançon, France, within the Erasmus+ EU Teaching Mobility program

October 2021 Postoctoral Research Fellow. Laboratory of ElectroOptics, Department of July 2023 Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia,

October 2018 **Ph.D. Candidate** in Electronics, Computer Science and Electrical Engineering. - September Laboratory of ElectroOptics, University of Pavia, Pavia, Italy 2021

March 2019 - Visiting Ph.D. Student. Nanometer Scale Engineering Laboratory, De-August 2019 partment of Mechanical Engineering, Photonics Center - Boston University, Boston, Massachusetts, United States of America. Scientific research on the characterization of NEMS (nano electro-mechanical systems) by means of laser interferometry

March 2018 - Exchange Erasmus Student with Erasmus+Traineeship scholarship. August 2018 MeBioS-Biosensor Group, KU Leuven, Leuven, Belgium. Research activity for the master thesis on the development of an innovative fiber optic biosensor based on surface plasmon resonance

Education

- October 2018 Doctor of Philosophy (Ph.D.) in Electronics, Computer Science and Elec-- September trical Engineering. Laboratory of ElectroOptics, University of Pavia, Pavia, 2021 Italy - Academic tutor: Prof. Sabina Merlo - Dissertation title: "Smart micro-opto-fluidic sensing platforms for contactless chemical and biological analyses" - Final evaluation: Excellent, April 8th 2022
- 2016 2018 Master of Science in Electronic Engineering (track: Photonics), University of Pavia, Pavia, Italy, Final grade: 110/110 cum Laude, September 25th 2018
- 2013 2016 **Bachelor of Science** in Bioengineering, University of Pavia, Pavia, Italy, Final grade: 105/110, September 20th 2016

2008 – 2013 **High School Diploma**, Liceo Giuseppe Peano, Tortona (AL), Italy, Final grade: 100/100, Track: Scientifico PNI (Piano Nazionale Informatica) - July 2013

Ph.D. Dissertation

Title Smart micro-opto-fluidic sensing platforms for contactless chemical and biological analyses

Abstract The main goal of this Ph.D. dissertation was the development of smart sensing platforms to analyze the optical properties of fluids for chemical and biological applications, exploiting label free, remote, contactless and non-invasive techniques. The solutions investigated are based on the use of well established opto-electronic components, traditionally developed for telecom application. in the visible and near infrared optical regions. Part of the research activity was carried on in the framework on the DSF (Dugutal Smart Fluidics) project founded by Regione Lombardia ("Research and Innovation

Hub" POR FESR 2014-2020).

Supervisor Prof. Sabina Merlo, University of Pavia

Master Thesis

Title Design and implementation of a dual-channel self-referencing fiber optic biosensor based on surface plasmon resonance

Abstract This thesis is focused on the theoretical investigation, fabrication and experimental testing of dual-channel self-referencing fiber optic surface plasmon resonance biosensors provided with a sensing region and a reference region that can sense refractive index variations of the surrounding medium independently. The sensing region was used to carry out aptamer-based bioassays and high resolution melting assays; the reference region was successfully exploited used to compensate for spurious signal variations, due to temperature and bulk refractive index changes [C4].

Supervisor Prof. Sabina Merlo, University of Pavia Co-supervisor Prof. Jeroen Lammertyn, KU Leuven

Laboratory Project for Bachelor Graduation Final Exam

Title Optical readout of biochemical sensors based on glass microfluidic devices

Supervisor Prof. Sabina Merlo

Computer Skills

Basic Abagus - C - HTML

Intermediate ImageJ - Office - SQL

Adavanced **MATLAB** code

Language Skills

Italian Native proficiency

English Full professional proficiency

French Elementary proficiency

Chinese Elementary proficiency

Language Certifications [Cambridge - ESOL]

March 2012 FCE (First Certificate in English) - Level B2

June 2010 PET (Preliminary English Test) - Level B1

Grade: C

Pass with merit

Scientific research activities within national and international collaborations

January 2023 Scientific collaborator of the ACOUSTIC project: "Sviluppo di circuiti - December integrati, Algoritmi e teCnologie meccanO-acustiche per trasformare superfici 2025 generiche in elementi acUSTici radianti ad altissima efflCienza". Project number: F/310010/01/X56. Funded my the Italian Ministry of Economic Development (MiSE)

October 2022

Research Fellow and scientific collaborator of the Fluid-o-Tech company - September (Corsico, Milano, Italy). Research contract titled "Studio di tecniche ottiche 2023 innovative per il riconoscimento di fluidi"

October 2021 Research Fellow and scientific collaborator of the project DSF: "Fluidica September

Digitale per le Scienze della Vita - DSF (Digital Smart Fluidics)", Call 2022 "Hub Ricerca e Innovazione" of Lombardia Region. Project ID: 1175234. Co-founded by POR FESR 2014-2020 INNOVAZIONE E COMPETITIVITÀ. Workpacages: WP3.4: Monitoraggio e controllo per terapie infusionali [NAD, CHEM-TDD, RIA] (NAD. Messa in rete e controllo) - WP3.8: Monitoraggio e controllo per terapie infusionali [NAD, CHEM-TDD, RIA] (CHEM. Realizzazione prototipo fisico) – WP3.13: Monitoraggio e controllo per terapie infusionali [NAD, CHEM-TDD, RIA] (RIA. Realizzazione prototipo fisico) -WP4.4b: Attività di sostenibilità - Lab@UniPV

March 2019 - Visiting research fellow at Nanometer Scale Engineering Laboratory, Pho-August 2019 tonics Center, Boston University (Boston, MA, USA)

March 2018 – **Visiting thesis student** at MeBioS-Biosensor Group, KU Leuven (Leuven August 2018 Belgium)

Teaching and Academic Activities

- A.Y. **Teaching Professor** of the classes of "Microsensors, Integrated Microsystems 2023/2024 and MEMS", "Electronics and Material Technology Applied to Medicine", "Statistics and Healthcare Management"
- February Reviewer for international scientific peer-reviewed journals in the field of 2022 now optics, photonics and electronic instrumentation and measurements (Optics Express, Sensors and IEEE Transactions on Instrumentation and Measurement)
- A.Y. **Short-term lecturer** ("seminari didattici") for the classes of "Biomedical 2020/2021 Optoelectronics" and "Biophotonics", Department of Electrical, Computer now and Biomedical Engineering, University of Pavia, Pavia, Italy
- March 2021 **Academic tutor** for the class of "Electronics 1" for students with DSA learning disorders, Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy
 - June 2020 **International Student Ambassador** for the Master Degree in Electronic December Engineering, University of Pavia, Pavia, Italy 2021
- March 2020 **Academic tutor** for the class of "Electronics 1", Department of Electrical, July 2023 Computer and Biomedical Engineering, University of Pavia, Pavia, Italy
- October 2018 University co-tutor of 3 bachelor theses and 7 master theses of students of the programs of Biomedical Engineering and Electronic Engineering, Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy
 - May 2017 Member of the commission for Gestione dell'Assicurazione della Qualità (AQ) for the Master Degree in Electronic Engineering for the Academic Year 2016/2017, University of Pavia, Pavia, Italy

Licenses

- January 2020 Esame di Stato per l'abilitazione alla professione di ingegnere Ordine degli Ingegneri della Provincia di Pavia
- January 2018 TSL (Tecnico della Sicurezza Laser) CEI and UNI laser safety standard

Awards

- march 2023 **Best Doctoral Thesis in Applied Photonics 2022** Award given by IEEE Photonics Society Italy Chapter for the best Ph.D. dissertation discussed in an Italian University
 - July 2021 **2021 IEEE Photonics Society Graduate Student Scholarship** Award established by IEEE Photonics Society to support graduate students giving excellent contributions in the field of photonics research
- September Best Oral Award First classified for the best oral presentation at ICOP2020 conference. Award offered by IEEE and SIOF
- May 2020 **Student Travel Grant and Award** for IEEE I2MTC 2020 International Instrumentation and Measurement Technology Conference
- December Best Contribution Award for the paper "In vivo recognition of vascular 2019 structures by near infra-red transillumination" presented at ECSA-6 6th International Electronic Conference on Sensors and Applications
- November Best Poster Award for the poster "Near-infrared transillumination of biolog-2018 ical tissues for functional imaging" given by IEEE Student Branch of Pavia and PESB Pavia Engineering Student Branch

Associations and Organizations

Scientific Associations

- 2019 now **Member of** the Italian Association **GMEE** (Gruppo Misure Elettriche ed Elettroniche)
- December Chair of IEEE Student Branch of the University of Pavia, Geo-code: 2019 July SBA10871 (Europe Region 8) 2023
- November **IEEE Women in Engineering Student Branch Affinity Group** of the 2017 July *University of Pavia*, Geo-code: SBA10871 (Europe Region 8)
 - 2023 Founder (official date: November 14th 2017)
 Chair (official date: November 14th 2017)
- 2016 now Member of IEEE (Institute of Electrical and Electronics Engineers). Member number: 94102840. Grade: Member Member of IEEE Instrumentation and Measurement Society, IEEE Photonics Society, IEEE Women in Engineering and IEEE Young Professionals

Cultural Associations

2009 - 2013 Editor for Agorà, school newspaper of Liceo G. Peano, Tortona (AL), Italy

Voluntary Associations

- 2013 2014 **Volunteer** for the project Palestra Aperta Giochi e attività sportive con ragazzi disabili, Tortona (AL), Italy
- 2011 2012 **Member of ENPA** (Ente Nazionale Protezione Animali) and **volunteer** at the Municipal Shelter of Tortona (AL), Italy

Scientific Publications

International Scientific Journals with Peer-Review Process

- [J1] G. Rigamonti, M. Guardamagna, V. Bello, S. Marconi, F. Auricchio, S. Merlo, "Flow-through micro-capillary refractive index sensor based on T/R spectral shift monitoring", Biomedical Optics Express, Vol. 8, No. 10, pp. 4438-4453 (2017). DOI: 10.1364/BOE.8.004438. Journal IF: 3.482
- [J2] G. Rigamonti, V. Bello, S. Merlo, "Spectral optical readout of rectangular-miniature hollow glass tubing for refractive index sensing", Sensors, Vol. 18, No. 2, Article No. 603, pp. 1-13 (2018). DOI: 10.3390/s.18020603. Journal IF: 3.031
- [J3] S. Merlo, V. Bello, E. Bodo, S. Pizzurro, "A VCSEL-based NIR transillumination system for morpho-functional imaging", Sensors, Vol. 19, No. 4, Article No. 851, pp. 1-12 (2019). DOI: 10.3390/s19040851. Journal IF: 3.275
- [J4] V. Bello, S. Merlo, "Micro-opto-fluidic sensing platform for analytes identification based on absorption properties in the NIR region", Analytical and Bioanalytical Chemistry, Vol. 412, No. 14, pp. 3351-3358 (2020). DOI: 0.1007/s00216-019-02375-z. Journal IF: 4.157
- [J5] V. Bello, A. Simoni, S. Merlo, "Spectral phase shift interferometry for refractive 2 index monitoring in micro-capillaries", Sensors, Vol. 19, No. 4, Article No. 1043, pp. 1-12 (2020). DOI: 10.3390/s20041043. Journal IF: 3.576
- [J6] V. Bello, E. Bodo, S. Merlo, "Near Infrared Absorption Spectroscopy in Microfluidic Devices with Selectable Pathlength", IEEE/OSA Journal of Lightwave Technology, Vol. 39, No. 2, pp. 4193-4200 (2021). DOI: 10.1109/JLT.2020.3040488. Journal IF: 4.142
- [J7] V. Bello, A. Simoni, S. Merlo, "Spectral Interferometric Detection of NIR Optical Resonances of Rectangular Refractive Index Sensing", IEEE Transactions on Instrumentation and Measurement, Vol. 70, Art. No. 7002609, pp.1-9 (2021). DOI: 10.1109/TIM.2021.3055832. Journal IF: 5.332
- [J8] E. Bodo, V. Bello, V. Asole, S. Merlo, "Multiwavelength fluidic sensing of water-based solutions in a channel microslide with SWIR LEDs", IEEE Transactions on Instrumentation and Measurement, Vol. 71, Art. No. 7000210, pp.1-10 (2022). DOI: 10.1109/TIM.2021.3132090. Journal IF: 5.332

- [J9] E. Bodo, S. Merlo, V. Bello, "Spectral Fingerprint Investigation in the near Infra-Red to Distinguish Harmful Ethylene Glycol from Isopropanol in a Microchannel", Sensors (special issue Selected Papers from the 8th International Electronic Conference on Sensors and Applications), Vol. 22, No. 2, Article no. 459 (2022). DOI: 10.3390/s22020459. Journal IF: 3.847
- [J10] V. Bello, E. Bodo, F. Nicollini, R. Calvaruso, S. Merlo, "Refractive Index Sensing in Microfluidic Channels with Integrated Reflectors by Measuring Light Spot Displacement", IEEE Transactions on Instrumentation and Measurement, Vol. 71, Art. No. 7003308, pp. 1-8 (2022). DOI: 10.1109/TIM.2022.3168941. Journal IF: 5.332
- [J11] V. Bello, W. Vandezande, D. Daems, J. Lammertyn, "Design and Implementation of a Dual-Region Self-Referencing Fiber-Optic Surface Plasmon Resonance Biosensor", ACS Sensors, Vol. 7, No. 11, pp. 3360–3368 (2022). DOI: 10.1021/acssensors.2c01362. Journal IF: 9.618
- [J12] V. Bello, E. Bodo, S. Merlo, "Optical Identification of Parenteral Nutrition Solutions Exploiting Refractive Index Sensing", Sensors, Vol. 22, No. 18, Article no. 6815 (2022). DOI: 10.3390/s22186815. Journal IF: 3.847
- [J13] V. Bello, E. Bodo, S. Merlo, "Speckle Pattern Acquisition and Statistical Processing for Analysis of Turbid Liquids", IEEE Transactions on Instrumentation and Measurement, Vol. 72, Art. no. 7005004, pp. 1-4 (2023). DOI: 10.1109/TIM.2023.3289543. Journal IF: 5.6

International Conferences with Proceedings

- [C1] S. Merlo, V. Bello, E. Bodo, R. Catalano, S. Pizzurro, M. Rossi Borghesano, "NIR transillumination system for in vivo functional imaging", DOI: 10.1117/12.2520116, SPIE Optics + Optoelectronics Optical Sensors 2019, April 1st-4th, 2019, Prague, Czech Republic. Published in SPIE Proceedings, Vol. 11028, Article no. 1102810. DOI: 10.1117/12.2520116
- [C2] V. Bello, E. Bodo, S. Pizzurro, S. Merlo, "Near-infrared transillumination of in vivo biological tissues for functional imaging", ISBN 978-1-7281-3837-4, DOI: 10.1109/BioPhotonics.2019.8896750, 4th International Conference on Biophotonics, September 15th-18th, 2019, Taipei, Taiwan. ISBN 978-1-7281-3837-4. DOI: 10.1109/BioPhotonics.2019.8896750
- [C3] V. Bello, E. Bodo, S. Pizzurro, S. Merlo, "In vivo recognition of vascular structures by near infra-red transillumination", 6th International Electronic Conference on Sensors and Applications, November 15th-30th 2019. Published in Proceedings, Vol. 42, No. 1, Article No. 24 (2020). DOI: 10.3390/ecsa-6-06639. Presentation by Valentina Bello

- [C4] V. Bello, S. Merlo, "Phase detection of the NIR optical resonances of rectangular glass micro-capillaries", I2MTC 2020 IEEE International Instrumentation and Measurement Technology Conference, May 25th-28th 2020, Dubrovnik, Croatia. DOI: 10.1109/I2MTC43012.2020.912963. Presentation by Valentina Bello
- [C5] V. Bello, A. B. Ari, M. S. Hanay, K. L. Ekinci, "Measurement and characterization of nano-electro-mechanical systems using laser interferometry", I2MTC 2020 IEEE International Instrumentation and Measurement Technology Conference, May 25th-28th 2020, Dubrovnik, Croatia. DOI: 10.1109/I2MTC43012.2020.9129282. Presentation by Valentina Bello
- [C6] V. Bello, E. Bodo, "A NIR-spectroscopy-based approach for detection of fluids in rectangular glass micro-capillaries", 7th International Electronic Conference on Sensors and Applications, November 15th-30th 2020. Published in Engineering Proceedings, Vol. 2, No. 1, Article no. 43 (2020). DOI: 10.3390/ecsa-7-08250. Presentation by Valentina Bello
- [C7] V. Bello, E. Bodo, S. Merlo, "Micro-opto-fluidic platform for spectroscopic identification of water-based fluids", SPIE Optics + Optoelectronics Digital Forum 2021, April 19th-23rd 2021. Published in SPIE Proceedings Optical Sensors 2021, Vol. 11772, 117720C. DOI: 10.1117/12.2589141
- [C8] V. Bello, E. Bodo, S. Merlo, "Quality Control of Ethanol-Based Hand Sanitizer Gels in Micro-Opto-Fluidic Devices", CLEO 2021 Virtual Conference, Paper no. JTh3A.87. DOI:10.1364/CLEO_AT.2021.JTh3A.87. Presentation by Valentina Bello
- [C9] E. Bodo, V. Bello, "Microfluidic Devices with Selectable Optical Pathlength for Quality Control of Alcoholic Solutions", 8th International Electronic Conference on Sensors and Applications, November 1st-15th 2021. Published in Engineering Proceedings, Vol. 10, No. 1, Article no. 13 (2021). DOI: 10.3390/ecsa-8-11286
- [C10] E. Bodo. S. Merlo, <u>V. Bello</u>, "Refractive Index Sensing in a Disposable Micro-Channel Provided with Integrated Reflectors Based on Laser Beam Shift",
 9th International Electronic Conference on Sensors and Applications,
 November 1st-15th 2022. Published in Engineering Proceedings, Vol. 27,
 No. 1, Article no. 49 (2022). DOI: 10.3390/ecsa-9-13195
- [C11] V. Bello, E. Bodo. S. Merlo, "A Smart Optofluidic Sensing Platform Ensuring Patients' Safety during Parenteral Nutrition Administration", 2023 Conference on Lasers and Electro-Optics Europe and European Quantum Electronics Conference (CLEO/Europe-EQEC), June 26th-30th 2023, Munich, Germany. DOI: 10.1109/CLEO/Europe-EQEC57999.2023.10232403. Presentation by Valentina Bello

- [C12] V. Bello, W. Vandezande, D. Daems, J. Lammertyn, "A Dual-Region Fiber-Optic SPR Biosensor with Self-Referencing Compensation of Bulk Refractive Index and Temperature Effects", 2023 Conference on Lasers and Electro-Optics Europe and European Quantum Electronics Conference (CLEO/Europe-EQEC), June 26th-30th 2023, Munich, Germany. DOI: 10.1109/CLEO/Europe-EQEC57999.2023.10231532. Presentation by Valentina Bello
- [C13] E. Bodo, V. Bello, S. Merlo, "Towards the development of a SWIR-LEDs based optoelectronic system for urea monitoring during haemodialytic therapy", 2023 Conference on Lasers and Electro-Optics Europe and European Quantum Electronics Conference (CLEO/Europe-EQEC), June 26th-30th 2023, Munich, Germany. DOI: 10.1109/CLEO/Europe-EQEC57999.2023.10232293

International Conferences without Proceedings

- [W1] V. Bello, G. Rigamonti, S. Merlo, "Innovative micro-fluidic sensing platform based on glass rectangular micro-capillaries for refractive index detection", EBS 2019 2nd European Biosensor Symposium 2019, February 18th-21st 2019, Firenze, Italy. Presentation by Valentina Bello
- [W2] V. Bello, W. Vandezande, D. Daems, J. Lammertyn, "Theoretical investigation, fabrication and experimental testing of dual-channel self-referencing fiber-optic biosensors for biological interaction analysis. Presentation by Valentina Bello", DIATECH 2020, January 27th-29th 2020, Leuven, Belgium

National Conferences

- [N1] V. Bello, "Spectral optical readout of rectangular glass micro-capillaries for refractive index sensing", IEEE RTSI 2017 3rd International Forum on Research and Technologies for Society and Industry, September 11th-13th 2017, Modena, Italy. Presentation by Valentina Bello
- [N2] S. Merlo, V. Bello, G. Rigamonti, "Rifrattometro microfluidico realizzato tramite misure riflettometriche su micro-tubi in vetro a sezione rettangolare", XXXIV Congresso Nazionale di Misure Elettriche ed Elettroniche, September 13th-16th 2017, Modena, Italy
- [N3] S. Merlo, V. Bello, E. Bodo, S. Pizzurro, "Valutazione di informazioni morfofunzionali in tessuti biologici in vivo mediante transilluminazione infrarossa",
 III Forum Nazionale delle Misure, XXXVI Congresso Nazionale di Misure Elettriche ed Elettroniche, September 12th-14th, 2019, Perugia, Italy
- [N4] V. Bello, G. Rigamonti, S. Merlo, "Micro-capillary refractive index sensor based on monitoring of T/R ratio spectral shift", NANO-DAY IV, December 11th-14th 2019, Milano, Italy. Presentation by Valentina Bello

- [N5] V. Bello, E. Bodo, S. Pizzurro, "Morpho-functional in vivo imaging of biological tissues based on NIR transillumination", ICOP 2020 Italian Conference on Optics and Photonics, September 9th-11th 2020, Parma, Italy. Presentation by Valentina Bello
- [N6] V. Bello, A. Simoni, "Spectral interferometry-based detection of optical resonances of micro-capillaries", ICOP 2020 Italian Conference on Optics and Photonics, September 9th-11th 2020, Parma, Italy. Presentation by Valentina Bello
- [N7] V. Bello, E. Bodo, S. Merlo "Interferometria spettrale per rivelazione di risonanze ottiche e misure di indice di rifrazione ad alta sensibilità", V Forum Nazionale delle Misure, September 16th-18th 2021, Giardini Naxos, Italy. Presentation by Valentina Bello
- [N8] V. Bello, E. Bodo, S. Merlo, "Rilevazione di fluidi senza contatto mediante spettroscopia ad assorbimento nel vicino infrarosso in dispositivi micro-fluidici multipasso", V Forum Nazionale delle Misure, September 16th-18th 2021, Giardini Naxos, Italy
- [N9] V. Bello, E. Bodo, S. Merlo, "Artificial nutrition at home: monitoring the compliance of the therapy with a smart opto-fluidic sensor", Workshop Ricerca e Nanomedicina, June 14th 2022, Pavia, Italy. Presentation by Valentina Bello
- [N10] E. Bodo, <u>V. Bello</u> S. Merlo, "Investigation of an optoelectronic system using SWIR-LEDs for urea monitoring during haemodialytic therapy", **VII Forum** Nazionale delle Misure, September 13th-15th 2023, Bologna, Italy

Book Chapters

[B1] V. Bello, E. Bodo, S. Merlo, "Optical readout techniques for smart detection of fluids in the near infrared wavelength region by means of rectangular glass micro-capillaries", Chapter 40 in "Sensors and Microsystems. AISEM2021. Series: Lecture Notes in Electrical Engineering", Vol. 918, G. Di Francia e C. Di Natale Eds., Springer Nature Switzerland. DOI: 10.1007/978-3-031-08136-1-40. ISBN 978-3-031-08135-4. First Online: 29 June 2022, ©2023

Pavia, September 18th 2023 Yours Faithfully, Valentina Bello