

Curriculum Vitae – Vito Vurro

Background and Research Interests:

I'm a physicist by education and I'm focused on the understanding and characterization of the interfaces with background from physics, chemistry, optoelectronics and material science. Since my early steps in research, I have always been fascinated and interested in biological and medical application. Following this interest I acquired bio-related skills such cell handling and maintenance, electrophysiological characterization and in vitro tissues realisation. I carry on my research working on material characterization, micro- and nano-fabrication, bio-printing as well as device characterization. I'm involved in project mainly focused on two topics: device for bioelectronics and light-driven bio-hybrid actuators for robotic and rehabilitation in which I'm focusing on the role of organic materials.

Technical Skills and Expertise:

Material Processing – Device Microfabrication – Interface Characterization – 3D Printing – Spectroscopy – Cell Culturing and Maintenance – Cell Signaling – Cell Electrophysiology – Tissue Engineering – Microscopy – Immunofluorescence – Image and Video Analysis and Processing – Signal Transduction and Processing – PCB Prototyping – Data Analysis

Education:

PhD in Physics @ Politecnico di Milano; February 2021 - Milan, Italy (cum laude).
Major in: Applied Physics, Spectroscopy, Photostimulation, Biophysics and Tissue Engineering.

Thesis Title: "Non-Genetic Optostimulation for Biohybrid Light-Driven Actuators".
Supervisor: prof. Guglielmo Lanzani.

Master of Science @ University of Bologna; March 2017 - Bologna, Italy (grade 110/110).

Major in: Applied Physics, Data Analysis, Image and Video Analysis, Models and Numerical Methods for Physics, Medical Physics, Physical Methods for Biology.

Thesis Title: "Organic Electrochemical Transistor: A tool for cell tissue monitoring".
Supervisor: prof. Beatrice Fraboni.

Training: Development of low Intensity signal set up for biological application.

Bachelor of Science @ University of Bari; July 2014 - Bari, Italy (grade 92/110).

Major in: Basic Physics, Mathematical and Physical Analysis, Problem Solving, Coding, Laboratory Skills.

Thesis Title: "From Valves to MOSFET: the concept of High Fidelity".
Supervisor: prof. Francesco Giordano.

Training: Development of a guitar tuner in labVIEW.

Summary of Research Activity

Author of 30 peer-reviewed papers of which 9 as first author (Last update: 24/10/2025).

- h-index: 12 (Google scholar); 10 (Scopus); 10 (WoS); 10 (ResearchGate).
- citation: 467 (Google scholar); 358 (Scopus); 359 (WoS); 420 (ResearchGate).

Research Experienced

Researcher @ Centre for Nanoscience and Technology, IIT, Milan (Italy) – since September 2024

Working on: NIR sensitive phototransducer for rehabilitation and biohybrid actuators.

Advisor: prof. Guglielmo Lanzani.

Visiting Scientist @ DBG group, Harvard University, Cambridge (USA) - since March 2024.

Working on: Engineered cardiac tissue photostimulation.

Advisor: prof. Kevin Kit Parker.

Post-Doc @ Physics Department, University of Bologna, Bologna (Italy) - from March 2023 to August 2024.

Working on: organic bioelectronics and textile electronics for biomedical application.

Advisor: prof. Beatrice Fraboni.

Post-Doc @ Center for Nanoscience and Technology, IIT, Milan (Italy) – from November 2021 to February 2023.

Working on: material-based photostimulation for biohybrid soft robotics and rehabilitation.

Advisor: prof. Guglielmo Lanzani.

Visiting Fellow @ DBG group, Harvard University, Cambridge (USA) - from March to August 2020.

Working on: cardiac tissue engineering for enabling material-based photostimulation.

Advisor: prof. Kevin Kit Parker.

PhD Fellow @ Physics Department, Politecnico di Milano, Milan (Italy) - from November 2017 to October 2021.

Working on: Phototransducer for living cells stimulation.

Advisor: prof. Guglielmo Lanzani.

Fellow Junior @ Center for Nanoscience and Technology, IIT, Milan (Italy) – from September 2017 to October 2017.

Working on: Smart Bio-interfaces for bio-photonic applications.

Advisor: prof. Guglielmo Lanzani.

Reviewer for International Journals

Referee for Science Advance, Nanoscale, AIP Advances, Frontiers in Bioengineering and Biotechnology, Cell Biochemistry and Biophysics, Optical Materials and Optical Materials X.

Awards

Best Communication @ SIF 2022 (12-16 September) – Milan (Italy) – Talk Title: “Muscle cells and tissue Photostimulation”.

Teaching Experience:

Teaching Assistant @ Università di Bologna, Bologna (Italy) - for the academic year 2023/2024

Course: “Physics I for Material Science” about Mechanic and Thermodynamic.

Teaching Assistant @ Politecnico di Milano, Milan (Italy) - for the academic year 2019/2020 and 2021/2022

Course: “Physics II for Electrical Engineer” about Electrostatic and Electromagnetism.

Advising Experience:

Supervision at both post-graduate and undergraduate level. I’m supervising three PhD candidates working on phototransducer and biohybrid actuators. During my PhD I supervised several master and bachelor students for their final project and thesis. I also supervised one PhD student @ the CNST (IIT) working on skeletal muscle cells photostimulation and two PhD students @ the Physic Department of the University of Bologna working on sensor for chemical and physical quantities.

Publication - accepted:

1. M. Wang, J. Fan, M. Bilodeau-Calame, C. Kim, C.L. Chiang, A. F. Chaverri Sgura, **V. Vurro**, I. Bargiggia, J. Mauzeroll, F. Cicoira – “Robust and flexible organic electrochemical transistors enabled by electropolymerized PEDOT” – *npj flexible electronics* (2025) doi: 10.1038/s41528-025-00457-w.
2. E. Pittella, F. Ramundo, P. Granello, A. Nascetti, M.S. Farissi, D. Calabria, G. Cortelli, F. Decataldo, B. Fraboni, I. Gualandi, E. Lazzarini, F. Mariani, A. Pace, E. Scavetta, M. Tessarolo, **V. Vurro**, M. Mirasoli, E. Sayin, F. Cialdai, L. notari, C. Risaliti, M. Monici, E. Gabriele, F. Lorenzini, P. Luciano - "Preliminary Tests on a Wearable Moisture Sensor System for Monitoring Astronauts Wound Healing" - *IEEE Medical Measurements & Application* (2025) doi: 10.1109/MeMeA65319.2025.11067987.
3. L. G. D’Amico, C. Zhang, F. Decataldo, **V. Vurro**, M. Tessarolo, I. Gualandi, F. Mariani, E. Scavetta, T. Cramer, B. Fraboni – “Fully Passive Electrochemical Oxygen Sensor Enabled with Organic Electrochemical Transistor.” – *Adv. Mat. Technologies* (2024) doi: 10.1002/admt.202401875.
4. F. Ceccardi, F. Decataldo, **V. Vurro**, M. Tessarolo, I. Gualandi, B. Fraboni, E. Scavetta – “A point-of-care, label-free OECT sensor for uric acid detection: validation in huma saliva” – *Electrochimica Acta* (2024) doi: 10.1016/j.electacta.2025.145834.
5. C. Florindi, Y. Jang, K. Shani, P. Moretti, C. Bertarelli, G. Lanzani, K.K. Parker, F. Lodola*, **V. Vurro*** - "A Cardiac Microphysiological System for Studying Ca²⁺

Propagation via Non-genetic Optical Stimulation" - J. Vis. Exp., e67823 (2025) doi: 10.3791/67823.

6. C. Florindi, **V. Vurro**, P. Moretti, C. Bertarelli, A. Zaza, G. Lanzani, F. Lodola - "Role of stretch-activated channels in light-generated action potential mediated by an intramembrane molecular photoswitch" - *Journal of Translational Medicine* 22, 1068 (2024) doi: 10.1186/s12967-024-05902-4.
7. G. Lanzani, G. Chiaravalli, E. Colombo, G. Manfredi, S. Di Marco, **V. Vurro**, F. Benfenati – “Nanotechnology for Vision Restoration” – *Nature Review Bioengineering* 2, 10 (2024) doi: 10.1038/s44222-024-00210-4.
8. F. Storti, S. Bonfadini, G. Bondelli, **V. Vurro**, G. Lanzani, L. Criante – “Photocell-Based Optofluidic Device for Clogging-Free Cell Transit Time Measurements” – *Biosensors* 14 (4), 154 (2024) doi: 10.3390/bios14040154.
9. A. Ghezzi, A. Farina, **V. Vurro**, A. Bassi, G. Valentini, C. D’Andrea – “Fast data fitting scheme for compressive Multispectral Fluorescence Lifetime Imaging” – *Optics Letters* 49, 278-281 (2024) doi: 10.1364/OL.506378.
10. V. Venturino*, **V. Vurro***, S. Bonfadini, S. Perotto, V. Sesti, L. Criante, C. Bertarelli, G. Lanzani - “Skeletal muscle opto-stimulation by intramembrane molecular transducers” - *Comm Biology* (2023) doi: 10.1038/s42003-023-05538-y.
11. M. Moschetta, **V. Vurro**, V. Sesti, C. Bertarelli, G.M. Paternò, G. Lanzani - “Modulation of Mechanosensitive Potassium Channels by a Membrane-Targeted Non-Genetic Photoswitch” – *J. Phys. Chem. B.* (2023) doi: 10.1021/acs.jpcc.3c04551.
12. **V. Vurro**, A. Magni, L. Aloisio, G. Lanzani - "Photostimulation mechanism of an amphiphilic azobenzene" - *Nuovo Cimento C* (2023) doi: 10.1393/ncc/i2023-23143-5.
13. A. Magni, **V. Vurro**, G. Lanzani - "The effect of reiterated cell photo-stimulation with an azobenzene" - *Nuovo Cimento C* (2023) doi: 10.1393/ncc/i2023-23154-2.
14. **V. Vurro***, K. Shani*, H. A. M. Ardoña, J. F. Zimmerman, V. Sesti, K. Y. Lee, Q. Jin, C. Bertarelli, K. K. Parker, G. Lanzani - "Light-triggered cardiac microphysiological model" - *APL Bioeng.* 7, 026108 (2023) doi: 10.1063/5.0143409.
15. **V. Vurro***, M. Moschetta*, G. Bondelli*, S. Sardar, A. Magni, V. Sesti, G. M. Paternò, C. Bertarelli, C. D’Andrea, G. Lanzani - "Membrane Order Effect on the Photoresponse of an Organic Transducer." - *Membranes*. 13, 538 (2023) doi: 10.3390/membranes13050538.
16. L. Aloisio, M. Moschetta, A. Boschi, A. G. 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. D. Maria - "Insight on The Intracellular Supramolecular Assembly of DTTT: A Peculiar Example of Cell Driven Polymorphism. *Adv. Mater.*, 2302756 (2023) doi: 10.1002/adma.202302756.
17. A. Ghezzi, A. J. M. Lenz, F. Soldevila, E. Tajahuerce, **V. Vurro**, A. Bassi, G. Valentini, A. Farina, C. D’Andrea, Computational based time-resolved multispectral fluorescence microscopy." - *APL Photonics*. 8, 046110 (2023) doi: 10.1063/5.0135452.

18. **V. Vurro**, B. Federici, C. Ronchi, C. Florindi, V. Sesti, S. Crasto, C. Maniezzi, C. Galli, M. R. Antognazza, C. Bertarelli, E. Di Pasquale, G. Lanzani, F. Lodola - "Optical modulation of excitation-contraction coupling in human-induced pluripotent stem cell-derived cardiomyocytes." - *iScience*. 26, 106121 (2023) doi: 10.1016/j.isci.2023.106121.
19. S. Pecorario, A. D. Scaccabarozzi, D. Fazzi, E. Gutiérrez-Fernández, **V. Vurro**, L. Maserati, M. Jiang, T. Losi, B. Sun, R. R. Tykwinski, C. S. Casari, M. Caironi - "Stable and Solution-Processable Cumulenyl sp-Carbon Wires: A New Paradigm for Organic Electronics." - *Adv. Mater.* 34, 2110468 (2022) doi: 10.1002/adma.202110468.
20. **V. Vurro**, I. Venturino, G. Lanzani - "A perspective on the use of light as a driving element for bio-hybrid actuation." - *Appl. Phys. Lett.* 120, 080502 (2022) doi: 10.1063/5.0078411.
21. G. Bondelli, S. Sardar, G. Chiaravalli, **V. Vurro**, G. M. Paternò, G. Lanzani, C. D'Andrea - "Shedding Light on Thermally Induced Optocapacitance at the Organic Biointerface." - *J. Phys. Chem. B*. 125, 10748–10758 (2021) doi: 10.1021/acs.jpcb.1c06054.
22. G. Manfredi, F. Lodola, G. M. Paternò, **V. Vurro**, P. Baldelli, F. Benfenati, G. Lanzani - "The physics of plasma membrane photostimulation." - *APL Mater.* 9, 030901 (2021) doi: 10.1063/5.0037109.
23. **V. Vurro***, G. Bondelli*, V. Sesti, F. Lodola, G. M. Paternò, G. Lanzani, C. Bertarelli - "Molecular Design of Amphiphilic Plasma Membrane-Targeted Azobenzenes for Nongenetic Optical Stimulation." - *Front. Mater.* 7, 631567 (2021) doi: 10.3389/fmats.2020.631567.
24. **V. Vurro***, A. D. Scaccabarozzi*, F. Lodola, F. Storti, F. Marangi, A. M. Ross, G. M. Paternò, F. Scotognella, L. Criante, M. Caironi, G. Lanzani - "A Polymer Blend Substrate for Skeletal Muscle Cells Alignment and Photostimulation." - *Adv. Photonics Res.* 2, 2000103 (2021) doi: 10.1002/adpr.202000103.
25. G. M. Paternò, E. Colombo, **V. Vurro**, F. Lodola, S. Címò, V. Sesti, E. Molotokaite, M. Bramini, L. Ganzer, D. Fazzi, C. D'Andrea, F. Benfenati, C. Bertarelli, G. Lanzani - "Membrane Environment Enables Ultrafast Isomerization of Amphiphilic Azobenzene." - *Adv. Sci.* 7, 1903241 (2020) doi: 10.1002/advs.201903241.
26. M. L. DiFrancesco, F. Lodola, E. Colombo, L. Maragliano, M. Bramini, G. M. Paternò, P. Baldelli, M. D. Serra, L. Lunelli, M. Marchioretto, G. Grasselli, S. Címò, L. Colella, D. Fazzi, F. Ortica, **V. Vurro**, C. G. Eleftheriou, D. Shmal, J. F. Maya-Vetencourt, C. Bertarelli, G. Lanzani, F. Benfenati - "Neuronal firing modulation by a membrane-targeted photoswitch." - *Nat. Nanotechnol.* 15, 296–306 (2020) doi: 10.1038/s41565-019-0632-6.
27. F. Lodola*, **V. Vurro***, S. Crasto, E. Di Pasquale, G. Lanzani - "Optical Pacing of Human-Induced Pluripotent Stem Cell-Derived Cardiomyocytes Mediated by a Conjugated Polymer Interface." - *Adv. Healthc. Mater.* 8, 1900198 (2019) doi: 10.1002/adhm.201900198.

28. F. Decataldo, M. Barbalinardo, M. Tessarolo, **V. Vurro**, M. Calienni, D. Gentili, F. Valle, M. Cavallini, B. Fraboni - "Organic Electrochemical Transistors: Smart Devices for Real-Time Monitoring of Cellular Vitality." - *Adv. Mater. Technol.* 4, 1900207 (2019) doi: 10.1002/admt.201900207.

- Submitted:

1. C. Florindi, K. Shani, V. Vurro, Y. Jang, P. Moretti, M. Prondzynski, Y. Tharani, V.J. Bezzerides, W.T. Pu, C. Bertarelli, G. Lanzani, A. Zaza, K.K. Parker – "Optotermiation of spiral wave reentry by a membrane-targeted phototransducer" – *Cell Biomaterials* (2025)
2. G. Simoncini, I. Venturino, F. Marangi, V. Vurro, A. Bartolucci, L. Vannozzi, P. Moretti, L. Aloisio, M. Rossi, G.M. Paternò, C. Bertarelli, G. Lanzani – "Electrospun Polymeric Scaffold Enables 3D Tissue-like Functionality and Efficient Photoinduced Contraction" – *Material Horizon* (2025)

Conferences - Invited Speaker

- **Orbitaly 2025** (September 2025) – Brescia (Italy) – "Light-Controlled Biointerfaces for Muscular Tissue-Engineered Systems".
- **NanoSeries** (June 2025) – Valencia (Spain) - "Non-genetic Approches for Muscle Tissues Photostimulation".
- **NAWA STER lecture** (November 2024) – Warsaw (Poland) - about bio-inspired chemistry at the Institute of Physical Chemistry, Polish Academy of Sciences
- **eMRS Fall Meeting** (September 2024) – Warsaw (Poland) – "Textile electronics for wearable electronics in biomedical field".
- **IEEE Internationa Conference on Biomedical Robotics and Biomechatronics – BioRob2024** (September 2024) – Heidelberg (Germany) – "The Light as a Driving Element for Biohybrid actuation".
- **Green Electronics Conference** (September 2023) – Novi Sad (Serbia) – "Textile electronics as environmental-friendly approach for wearable electronics and biomedical applications".
- **Living Machines** (July 2023) – Genova (Italy) – Workshop "Biohybrid actuators and enabling technology: setp-by-step towards futuristic machines" – "The Light as a Driving Element for Biohybrid actuation".
- **Next Generation Sustainable, Bio-mimetic, Bio-inspired and Bio-enabled Materials** (September 2022) – Venezia (Italy) – "Biohybrid Light-Driven Actuation".

- Oral Contribution

- **MRS Fall Meeting** (December 2022) – Boston (USA) – talk title: "Membrane-Targeted Photoswitch Induces Cardiac Cells and Tissue Optical Pacing".
- **Italian Soft Days** (September 2022) – Bari (Italy) – talk title: "Muscle Cells and Tissue Optical Pacing".

- **Italian Physics Society** (September 2022) – Milan (Italy) – talk title: “Muscle Cells and Tissue Photostimulation”.
- **MRS Fall Meeting** (December 2021) – Boston (USA) – talk title: “Cardiac Cells Non-Genetic Optostimulation”.
- **MRS Fall Meeting** (December 2019) – Boston (USA) – talk title: “Cardiomyocytes Optical Stimulation”.
- **IFSOE** (September 2019) – Moscow (Russia) – talk title: “Cardiomyocytes Optical Pacing Mediated by Micro-Patterned Polymer Interface”.
- **CNST Winter Workshop** (December 2018) – Como (Italy) – talk title: “Physics of Cardiomyocytes Optical Stimulation”.
- **Materials** (October 2018) – Bologna (Italy) – talk title: “Polymeric Micro-Patterned Film for Optical Call Layer Pacing”.
- **EOSAM** (October 2018) – Delft (Netherlands) – talk title: “Optical Stimulation of Human Cardiomyocytes”.

- Poster Contribution

- **MRS Fall Meeting** (December 2022) – Boston (USA) – poster title: “NIR-Sensitive Polymer for Living Cell Photostimulation”.
- **MRS Fall Meeting** (December 2021) – Boston (USA) – poster title: “Micro-Patterned Polymer Interface for Muscular Cells Alignment and Stimulation”.
- **Orbitaly** (October 2019) – Naples (Italy) – poster title: “Cardiomyocytes Optical Stimulation”.
- **eMRS Fall Meeting** (June 2018) – Strasburg (France) – poster title: “Optical Stimulation of Human Cardiomyocytes”.

- Organizer

- **MRS Fall Meeting – Symposium Organizer** (December 2025) – Symposium SB06 – The interface of Optoelectronics and Biology
- **International School on Material Interfaces for Engineering Living Systems (MIELS)** (September 2025) – Como (Italy).
- **Orbitaly 2024** (September 2024) – Bologna (Italy).
- **Materials for Sustainable Development Conference (MAT-SUS)** – Symposium Organizer (October 2023) – Torremolinos (Spain).
- **International School on Biohybrid interfaces, Organic Bioelectronics and Biophotonics** (September 2022) – Como (Italy).

Software and Programming:

- Office – High Level User
- Matlab – High Level User
- LabView – Good Level User
- Latex – Good Level User
- Comsol – Medium Level User

Personal Skills:

- Problem Analyzer and Solver
- Flexible and Adaptable
- Team Player
- Positive and Enthusiastic