



Italian Society of Photobiology XXXIII Annual Conference
Akademie Cusanus – Bressanone 18-19 July 2022

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Conference Program

July 18 - 19, 2022 Annual Conference Program

Monday 18 July 2022

8:30 - 9:00	REGISTRATION
9:00 - 9:15	OPENINGS Valentina Rapozzi - Giorgia Miolo
Chair	Francesco Milano
9:15 - 9:45	Emiliano Altamura "Semi-synthetic bottom-up approach for photosynthetic artificial cell construction"
9:45 - 10:00	Paola Albanese "The implementation of chloroplasts as oxygen-producing organelles in artificial cell"
10:00 - 10:15	Rossella Labarile "Biocompatibility of dopamine with the photosynthetic growth of <i>R. sphaeroides</i> "
10:15 - 10:30	Lilian Torquato "Intact photosynthetic bacteria-based biophotonodes exposed to nitrophenol contaminants"
10:30 - 11:00	COFFEE BREAK
Chairs	Massimo Trotta - Giorgia Miolo
11:00 - 11:30	Kristjan Plaetzer "Adding Photodynamic Inactivation to the farmer's toolbox to fight plant pathogens"
11:30 - 11:45	Michael Glueck "Sodium magnesium chlorophyllin based sunlight-PDI against plant pathogenic <i>Clavibacter michiganensis</i> "
11:45 - 12:00	Christoph Hamminger "Photodynamic Inactivation of fungal plant pathogens"
12:00 - 12:15	Andreas Fellner "Fresh, safe and healthy food: Photodynamic Decontamination of seeds and sprouts from <i>Listeria innocua</i> "
12:15 - 12:30	Viviana Orlandi "Light at 410 nm controls the growth of contaminant bacteria in fishery field"
12:30 - 14:00	LUNCH BREAK
Chairs	Valentina Rapozzi - Enrico Caruso
14:00 - 14:10	YOUNG INVESTIGATORS AWARD
14:10 - 14:35	Greta Avancini "Keratin nanoparticles and photodynamic therapy enhance the anticancer stem cells activity of salinomycin"
14:35 - 15:00	Matteo Di Giosia "Bio-Conjugated Fullerenes: Innovative Platforms for Phototheranostic Applications"
15:00 - 15:25	Luca Menilli "Light-Activated Nitric Oxide Generators for Cancer Therapy"
15:25 - 16:00	COFFEE BREAK
Chairs	Carlo Musio - Matteo Calvaresi
16:00 - 16:30	Benoit Piro "Electrolyte-gated transistors for monitoring photosynthetic organisms"
16:30 - 16:45	Greta Varchi "Prodrugs-based nanoparticles combining anticancer chemo- and photo-therapy"
16:45 - 17:00	Sonja Visentin "Switch on the mucin, a powerful cancer biomarker"
17:00 - 17:15	Rosa Matteucci "Bio-based electrodes in photobioelectrochemical systems for environmental monitoring"
17:15 - 17:30	Nina Burduja "Sulfobutylether β cyclodextrin / porphyrins nanocomplexes for pathogens sensing"
17:30 - 17:45	Carlo Musio "Light regulation of transcripts of classic and unconventional opsins in the eyeless cnidarian <i>Hydra</i> "
17:45 - 19:00	SIFB meeting (shareholders only)
20:30	SOCIAL DINNER

Tuesday 19 July 2022

Chair	Antonino Mazzaglia - Greta Varchi
8:45 - 9:15	Fabienne Dumoulin "Updates on the use and role of phthalocyanines in PDT"
9:15 - 9:30	Miryam Malacarne "Synthesis and evaluation of the biological activity of porphyrin-peptide conjugates with specific targeting against TNBC"
9:30 - 9:45	Marzia Gariboldi "Free and poly-methyl methacrylate-bounded BODIPYs for photodynamic therapy"
9:45 - 10:00	Benedetta Fongaro "Photostability studies on therapeutic monoclonal antibodies: the case of Ipilimumab"
10:00 - 10:15	Nadia Barbero "Quasomes loaded with a squaraine dye as powerful nanovesicles for Photodynamic Therapy"
10:15 - 10:30	Matteo Calvaresi "Engineered bacteriophages: Effective viral vectors for receptor targeted anticancer photodynamic/sonodynamic therapy"
10:30 - 11:05	COFFEE BREAK
Chair	Francesca Moret - Viviana Orlandi
11:05 - 11:20	Carlo Matera "Photoswitchable molecular prosthetics to photocontrol auditory neurons"
11:20 - 11:35	Mariachiara Gani "The Role of Nitric Oxide in the bystander effect in photooxidized prostate cancer cells"
11:35 - 11:50	Giacomo Insero "First Prototype of an Innovative 222 nm Device for the Suppression of Airborne Viral Epidemic Spread"
11:50 - 12:05	Francesco Garzella "Innovative Ultraviolet light barriers for the Suppression of Airborne Viral Epidemic Spread"
12:05 - 12:20	Annette Wimmer "Tackling antimicrobial resistance in agriculture: Photodynamic Inactivation of <i>Erwinia amylovora</i> "
12:20 - 12:35	Giovanni Romano "The role of biofilm optical properties in the modulation of photokilling efficacy: a theoretical model"
12:35 - 14:00	LUNCH BREAK
Chair	Marina Venturini - Giovanni Romano
14:00 - 14:30	Franz Trautinger "Phototherapy for cutaneous T cell lymphomas"
14:30 - 14:45	Mariateresa Rossi "Deeds and misdeeds about sunscreens"
14:45 - 15:00	Carlotta Pontremoli "Antimicrobial PDT: nanoparticles incorporating cyanines and squaraines as new nanophotosensitizers"
15:00 - 15:15	CLOSING CERIMONY

Conference keywords
Applied Photobiology and Biophysics
Optical and spectroscopic methods applied to biology, medicine and biosafety
Light -responsive materials
In vitro photodynamic investigations: focus on antimicrobial and antitumoral strategies
Light and human health

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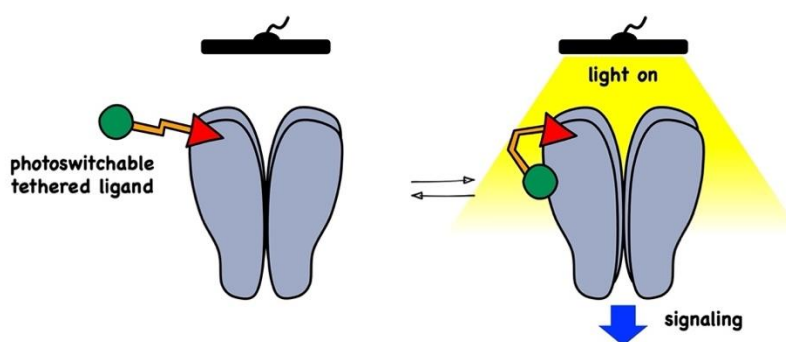
Carlo Matera

Photoswitchable molecular prosthetics to photocontrol auditory neurons

Carlo Matera^{1,2,3}, Aida Garrido-Charles^{1,2,4,5}, Antoine Huet^{4,5,6}, Anupriya Thirumalai^{4,6}, Jordi Hernando⁷, Amadeu Llebaria⁸, Tobias Moser^{4,5}, Pau Gorostiza^{1,2,9}

¹Institute for Bioengineering of Catalonia, Barcelona Institute for Science and Technology, 08028 Barcelona, Spain. ²Network Biomedical Research Center in Bioengineering, Biomaterials, and Nanomedicine, 28029 Madrid, Spain. ³Department of Pharmaceutical Sciences, University of Milan, 20133 Milan, Italy. ⁴Institute for Auditory Neuroscience and InnerEarLab, University Medical Center Göttingen, 37075 Göttingen, Germany. ⁵Cluster of Excellence "Multiscale Bioimaging: from Molecular Machines to Networks of Excitable Cells", University of Göttingen, 37075 Göttingen, Germany. ⁶Auditory Circuit Lab, Institute for Auditory Neuroscience and InnerEarLab, University Medical Center Göttingen, Germany. ⁷Departament de Química, Universitat Autònoma de Barcelona, Cerdanyola del Vallès 08193, Spain. ⁸Institute of Advanced Chemistry of Catalonia, Consejo Superior de Investigaciones Científicas, 08034 Barcelona, Spain. ⁹Catalan Institution for Research and Advanced Studies (ICREA), 08010 Barcelona, Spain.

Light-controllable chemical tools provide powerful means to manipulate and interrogate biological functions with high spatiotemporal precision and low invasiveness. Our research efforts in the field have focused on the design of reversible photoswitchable compounds to photocontrol enzymes, GPCRs, and ion channels. We have developed phototrexate, the first photoswitchable inhibitor of the human dihydrofolate reductase with demonstrated cytotoxicity *in vitro* and in zebrafish larvae [1], PAI, a light-controlled dualsteric agonist of muscarinic M₂ receptors that enabled the photomodulation of cardiac function in tadpoles and of brain states in mice [2,3], and azodopa, a photoswitchable dopamine D₁ receptor agonist that was used to photocontrol swimming behavior in zebrafish larvae and neural activity in mouse cortex [4]. More recently, we have designed a fast photoswitchable tethered ligand of ionotropic glutamate receptors to enable control of the auditory neurons. This compound, named TCP_{fast}, induced photocurrents in untransfected neurons upon covalently tethering to endogenous glutamate receptors and activating them reversibly with visible light pulses of few milliseconds. We applied it to the ultrafast synapses of cochlear auditory neurons that encode sound and provide auditory input to the brain. TCP_{fast} functions as a molecular prosthesis that bypasses the neurotransmitter-encoded signal with a photonic signal. Photosensitization of cochlear spiral ganglion neurons (SGNs) by locally administered TCP_{fast} enabled temporally precise light-evoked SGN firing up to a rate of approximately 1 kHz, matching the fastest optogenetic SGN stimulation. Hence, TCP_{fast}-mediated photopharmacology might serve as an interesting alternative to the optogenetic approach for the development of an optical cochlear implant for hearing restoration [5]. The results of these studies will be presented and discussed.



- [1] Matera C et al. *Journal of the American Chemical Society* 2018, 140 (46), 15764–15773.
- [2] Riefolo, F, Matera C et al. *Journal of the American Chemical Society* 2019, 141 (18), 7628–7636.
- [3] Barbero-Castillo A, Riefolo F et al. *Advanced Science* 2021, 8 (14), 2005027.
- [4] Matera C et al., manuscript in preparation.
- [5] Garrido-Charles A, Huet A, Matera C et al., *Journal of the American Chemical Society* 2022, in press.