Alessia Lena Curriculum Vitae

Education:

01/2022 - 2025 **Ph.D. in Food and Human Health** - DM 1061 Ciclo XXXVII - FSE REACT EU - PON, entitled "Application of an eco-sustainable technology: use of direct and photodynamic UV light for the microbial decontamination in food industries"
Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Udine, Italy

21/02/2025 Resubmission of peer-reviewed thesis (with minor revision) on PICA (Piattaforma Integrata Percorsi Accademici)

06/2024–09/2024: **Visiting researcher**
University of Aveiro (UA), Aveiro (Portugal)

06/2023-12/2023 **Visiting researcher**
MicroBio Laboratory, Electrolux Italia S.p.A., Porcia (Italy)

10/2021-03/2022 **Mater in Food Safety Management** - (CSQA- Scuola di Management Agroalimentare)
Attestati ottenuti:

- Progettista di Food Safety System – Corso qualificato AICQ-SICEV Reg. n.194
- Manager di sistema ISO 22000:2018 + FSSC – Corso qualificato AICQ-SICEV Reg. n.195
- Manager e Auditor di sistemi BRC e IFS – Corso qualificato AICQ-SICEV Reg. n.196
- Manager e Auditor di Food Defence System – Corso qualificato AICQ-SICEV Reg. n.197
- Manager e Auditor di Supply Chain System / ISO 22005 – Corso qualificato AICQ-SICEV Reg.n.198
- Lead Auditor di Food Safety System – Corso qualificato AICQ-SICEV qualificato Reg. n.199
- Lead Auditor di Sistemi di Gestione per la Sicurezza Alimentare ai sensi di UNI EN ISO 22000 Corso qualificato AICQ-SICEV Reg. n.95

10/2019–29/09/2021: **Master's degree in food science for Innovation and Authenticity - 2nd year path: Applied Engineering and Genetic**
(110/110)
Free University of Bozen, Bozen (Italy)

10/2016–15/07/2019: **Bachelor's degree in food science and technology**
(102/110)
University of Udine, Udine (Italy)

09/2011–06/2016: **High School diploma of Liceo Scientifico** (Diploma di Maturità Scientifica)
Liceo Scientifico Le Filandiere, San Vito al Tagliamento (PN) (Italy)

Research experiences:

02/2025-now **Visiting researcher** at the University of Udine, Department of Agricultural, Food, Environmental and Animal Sciences (DI4A). Research Topics: application of innovative technology for surface sanitation; assessment of food product shelf life (food safety).

Supervisor: Prof. Michela Maifreni
Microbiology Group, Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Udine (Italy).

01/2021-2025

Ph.D. in Food and Human Health entitled "Application of an eco-sustainable technology: use of direct and photodynamic UV light for microbial decontamination in food industries".
This Ph.D. project dealt with assessing Blue LED Light (BLL) as a new technology to inactivate food-related bacteria and its possible application in food-related contexts. Different operative conditions were applied, and the tested bacteria were *E. coli*, *S. aureus*, *L. monocytogenes, S. enterica*, *B. subtilis* and *P. fluorescens* in their planktonic and biofilm form. Both endogenous (porphyrins) and exogenous (curcumin, methylene blue) photosensitisers were exploited. The bacterial membrane damage, ROS and peroxide production were assessed. A photoactive material was tested as a possible indirect way to apply the BLL. Finally, the application of BLL was conducted on milk and milk-related surfaces. Also, a technological transfer was carried out to apply this technology to food company appliances. Since this was a PON project, a part of it was carried out at Electrolux Italia.

Supervisor: Prof. Michela Maifreni
Microbiology Group, Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Udine (Italy)

08/2024–
09/2024

Visiting researcher at the University of Aveiro, Department of Biology, Aveiro (Portugal) for part of the PhD project. Investigation of photodynamic Inactivation (PDI) of *E. coli* and *L. monocytogenes* in their planktonic and biofilm forms using Methylene Blue as an exogenous photosensitiser in buffer media (PBS) and milk.

Supervisor: Prof. Adelaide Almeida
Laboradorio de Microbiologia Aplicada (LMA), Biology Department, University of Aveiro, Aveiro, Portugal

06/2023-
12/2023

Visiting researcher at Electrolux Italia, Porcia (PN), Italy, as a part of the PhD project. Use of Blue light (405 nm) and UVA (365 nm) for the microbial inactivation of food pathogens (*E. coli*, *S. aureus, L. monocytogenes*) at room temperature (23°C) and at refrigerated temperature (4°C). Evaluation of the microbial inactivation in suspension, evaluation of the amount of produced Reactive Oxygen Species - ROS - (DCFH-DA) to confirm the principal dogma of photobiology and to relate the microbial inactivation to the produced ROS, evaluation of the lipid peroxidation (TBAR) and of the membrane damage operated by using Real-Time PCR using a fluorescent dye (PMAxx) to compare plate count results to Real-Time PCR results.

Supervisors: Monica Celotto, PhD; Federico Paroni, PhD
Product Technology Group (PTO), Electrolux Italia, Porcia (PN), Italy

02/2021–
06/2021

Internship project for the master thesis entitled "Sourdough biotechnology: exploitation of autochthonous microbiota for South Tyrol bread making". The thesis, done in collaboration with Schmidt company (Lana, BZ), was aimed at developing a stable sourdough with autochthonous microorganisms for the industrial-scale production of sourdough bread. The thesis consisted of four main steps. First, autochthonous lactic acid bacteria (LAB) and yeasts were isolated from organic wheat (OW) and light spelt (LS) flours commonly used by the company for bread production. Second, ten combinations were proposed as mixed starters to develop sourdoughs for each flour. Strains belonging to the Free University of Bozen – Micro4Food laboratory collection were also included in this process. Sourdoughs were characterized based on pH, total titratable acidity (TTA), total free amino acids (TFAA), organic acids (OA), fermentation quotient (FQ), LAB and yeast cell densities and sensory properties allowing to selection of the three most promising sourdoughs for each flour. Third, such sourdoughs were used to produce bread at

the pilot plant scale. Based on the sensory evaluation of bread, one sourdough was finally selected for each flour.

Supervisors: Prof. Marco Gobbetti, Prof. ssa Raffaella di Cagno, Dr. Andrea Polo
Micro for food group, Department of Technology, University of Bozen, Bozen (Italy)

01/2016-03/2016

Internship project for the bachelor thesis entitled "Effetto dei campi elettrici pulsati su alcune proprietà di dispersioni di proteine di albume d'uovo".
The thesis aimed to assess the optimal conditions for treating proteins in a medium-intensity (MiPEF) pilot plant (< 2 kV/cm). Saline solutions and egg albumen suspensions were treated with PEF at different frequencies (1 - 400 Hz), voltages (100 - 500 V), electric field (0.3 – 0.6 kV/cm) and number of pulses (1 – 60,000) to assess the maximum operative conditions of the pilot plant. Other output parameters (*Uk*, *WT*, *E*, *RT*, *Tf(ad)*) provided by the software were monitored.
The PEF treatment effect was evaluated through the phase separation, the particle dimension and their superficial charge through the *dynamic light scattering* (DLS)

Supervisors: Prof. ssa Lara Manzocco, Prof. ssa Stella Plazzotta
Food Technology Group, Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Udine (Italy

Scientific competences

- Knowledge of microbial ecology
- Knowledge of microbiological techniques for food matrices analysis (e.g., salad, milk, almonds, sourdough, flours, etc)
- Ability to manipulate type 2 biological agents
- Use of Blue Light and UV light for microbial inactivation
- Ability to perform DNA extraction of bacteria and yeasts with a commercial kit and with the phenol-chloroform method
- Ability to carry out PCR, RAPD-PCR and Real-Time PCR
- Ability to cultivate biofilms *in vitro* and *ex vivo*
- Ability to work and isolate microorganisms from food matrices (pathogens, spoilage microorganisms, lactic acid bacteria, yeasts)
- Ability to prepare samples for visualisation with CLSM microscope
- Activity as a reviewer for scientific peer-reviewed international journal (Exploration of Drug Science)

Other competences

- Use of statistical programs (SPSS, GraphPad, R) for statistical analysis of data (ANOVA, MANOVA, t-test, post-hoc Tukey test)
- Excellent capability of using OFFICE (Excel, Word, PowerPoint)

Supervision

CO-SUPERVISOR of MASTER and BACHELOR student at:

- Department of Agricultural, Food, Environmental and Animal Sciences **(DI4A),** University of Udine, Italy.

Bachelor students

1. **Maddalena Girotto**: Applicazione della luce blu per l'inattivazione di biofilm microbici di microrganismi di origine alimentare (DI4A), July 2025.

2. **Simone Ferraro**: Applicazione della luce blu per l'inattivazione microbica di microrganismi di interesse alimentare (DI4A), 2024.
3. **Noemi Dodici:** Applicazione della foodinamica in ambito alimentare (DI4A), 2024.
4. **Lucia Misigoj:** Esposizione alla luce blu di diverse specie microbiche di origine alimentare per valutare l'effetto di inattivazione (DI4A), 2023.
5. **Stefano Paolini:** Inattivazione fotodinamica nei confronti di *E. coli* (DI4A), 2023.
6. **Erica Garon:** Attività antimicrobica della luce visibile nei confronti di *Bacillus* spp. e *Pseudomonas* spp (DI4A), 2023.
7. **Lorenzo Casagrande:** Utilizzo della luce ultravioletta per valutare la riduzione di biofilm microbico (DI4A), 2022.
8. **Gaia Todone:** Utilizzo del bioluminometro per la rilevazione della contaminazione di superfici del settore alimentare: un caso studio (DI4A), 2022.

Master Students

9. **Nicole Zanetti:** Fotoinattivazione microbica attraverso il contatto con matrici polimeriche di origine vegetale (DI4A), 2024.
10. **Matteo Vezil**: Studio delle potenzialità applicative della luce UV-C nel processo di produzione di mandorle lavate e pelate (DI4A), 2023.
11. **Alberto Saitta:** Applicazione della luce blu per l'inattivazione microbica di microrganismi di interesse alimentare (DI4A), 2023.

Teaching experiences

AA 2024-2025	**Teaching collaborator for the laboratory activities** Course: "Metodi Tradizionali per il controllo degli alimenti", held by Prof.ssa Michela Maifreni (10 hours)
AA 2024-2025 AA 2023-2024 AA 2022-2023	**Percorsi per le Competenze Trasversali e l'Orientamento** (PCTO). Food MIcrobiology, Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Italy.

Publications in peer-reviewed journal

1. **Lena A.,** Marino M., Manzano M., Comuzzi C., Maifreni M. "An Overview of the Application of Blue Light-Emitting Diodes as a Non-Thermic Green Technology for Microbial Inactivation in the Food Sector"; *Food Engineering Reviews* (2024). https://doi.org/10.1007/s12393-023-09355-1

Proceedings

2. Maifreni M., Marino M., Cossettini A., Pinamonti D., **Lena A.**, Manzano M. (2022). Quartz Crystal Microbalance (QCM): a biosensor to study the microbial biofilm formation in real-time. European Biotechnology Congress. Prague, Czech Republic. DOI: 10.2478/ebtj-2023-0004

In preparation:

3. **Lena A.,** Baggio A., Marino M., Maifreni M. "Antimicrobial effect of ionization technology on different surfaces";
4. **Lena A.,** Manzano M., Marino M., Comuzzi C., Maifreni M. "Assessment of the antimicrobial activity of Blue Light on *L. monocytgenes*, *E. coli*, *S. aureus*, *B. subtilis*, *S. enterica* and *P. fluorescens*";
5. **Lena A.,** Manzano M., Marino M., Comuzzi C., Maifreni M. "Application of Blue Light to inactivate planktonic cells and microbial biofilms of food pathogens";

Presentations to national and international conferences

Oral communications

Lena, A., Maifreni M. (2025). Application of Blue Light for the inactivation of planktonic and biofilm forms of *Listeria monocytogenes*. Single-Day SIFB Symposium (Online). Accepted oral communication (07/04/2025).

Lena, A., Maifreni M. (2024). Application of an eco-sustainable technology: use of direct and photodynamic UV light for the microbial decontamination on food industries. 28th Workshop on the Developments in the Italian PhD research on Food Science Technology and Biotechnology. Catania, Italy.

Poster contributions

Lena, A., Maifreni M. (2024). Unrevealing the antimicrobial Blue LED Light capacity for *E. coli* and *L. monocytogenes* inactivation. XIII Congress of Microbiologists of Serbia. Belgrade, Serbia.

Lena, A., Maifreni M. (2023). Photodynamic inactivation of *E. coli*, *L. monocytogenes* and *S.* Enterica: an overview. 20° Congress of European Society of Photoscience and Photobiology (ESP). Lion, France.

Lena, A., Maifreni M. (2023). Application of an eco-sustainable technology: use of direct and photodynamic UV light for the microbial decontamination on food industries. 27th Workshop on the Developments in the Italian PhD research on Food Science Technology and Biotechnology. Portici, Italy.

Lena, A., Maifreni M. (2022). Application of an eco-sustainable technology: use of direct and photodynamic UV light for the microbial decontamination on food industries. 26th Workshop on the Developments in the Italian PhD research on Food Science Technology and Biotechnology. Asti, Italy.

Memberships of scientific associations

- Società Italiana di fotobiologia - SIFB (Feb 2025)
- European Society of Photoscience and Photobiology - ESP(Jul 2023)

Grants & fellowships

2022-2025	**PhD scholarship** in "Food and Human Health" at the Department of Agricultural, Food, Environmental and Animal Sciences (DI4A), University of Udine (Italy).
2024-2025	**Incarico strumentale alla didattica** Course: Metodi Tradizionali per il controllo degli alimenti

Volunteer experience:

01/2025- now	Italian Teacher for foreign people Ospiti in Arrivo (UD) Italy
09/2010- 09/2014	Volunteer SCOUT Staff AGESCI San Vito al Tagliamento (PN) (Italy)

Languages:

ITALIAN - Mother tongue
ENGLISH - C1 (IELTS 7.0)
GERMANY - A2
PORTUGUES -A1