JESSICA COSTA

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Date of birth: 22.06.1993 Nationality: Italian Gender: Female

PRESENT POSITION

28.02.2023 – Present

Junior Researcher – CHIM/02 Chimica Fisica 03/A2 Modelli e metodologie per le scienze chimiche - **University of Siena** - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI)

Research project: "AGRITECH – Spectroscopic and spectrophotometric analysis of agricultural samples" - Tutor: Prof.ssa Rebecca Pogni.

- Physico-chemical analysis of complex matrices of wine and olive oils
- Use of Electron Paramagnetic Resonance (EPR) spectroscopy for traceability of different type of edible foods

WORK EXPERIENCE

16.11.2022 – 15.01.2023

Scholarship – University of Siena - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI)

Research project: "Caratterizzazione di biomelanine tramite spettroscopia di Risonanza Paramagnetica Elettronica (EPR) ed altre tecniche spettroscopiche e spettrofotometriche" - Tutor: Prof.ssa Rebecca Pogni. In collaboration with the OXYCO The Enzyme Factory – Barcellona (Spain)

- Characterization of biomelanin by UV-Visible and FTIR spectroscopy
- Use of EPR spectroscopy in continuous wave (CW) and pulse for the investigation of melanin radicals
- Analysis of antioxidant and chelating activity using EPR and UV-Vis

1.11.2020 – 31.10.2022

Research Fellow – CHIM/02 Chimica Fisica 03/A2 Modelli e metodologie per le scienze chimiche
University of Siena - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI). The Fellowship has been funded by the EU -EMFF/18/863697 – "FISH chitinolytic biowastes FOR FISH active and sustainable packaging material " FISH4FISH. Project Coordinator: Prof. Rebecca Pogni

Research project: "Immobilizzazione enzimatica di chitinasi per la produzione di chitooligosaccaridi da scarti chitinolitici per l'ottenimento di biocomposti attivi per packaging alimentare e caratterizzazione chimico fisica"- Scientific Coordinator: Prof.ssa Rebecca Pogni

- Preparation and characterization of biocomposites
- Enzymatic immobilization
- Synthesis and physico-chemical characterization of biopolymers
- LCA (Life Cycle Assessment) and S-LCA (Social- Life Cycle Assessment)

2018 – 2020

Tutor for DBCF Students and project POT DBCF-2019
University of Siena - Department of Biotechnology, Chemistry and Pharmacy (DBCF) - Siena (SI)

- Orientation activities and support for new students

EDUCATION AND TRAINING

2017 - 2020

Ph.D in Chemical and Pharmaceutical Sciences XXXIII cycle - *Doctor Europaeus*
University of Siena - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI)
Research project: "Use and characterisation of free or immobilised enzymatic systems for the synthesis and functionalisation of new materials"- Advisor: Prof. Rebecca Pogni

- Enzymatic immobilization into magnetic nanoparticles and chitosan beads
- Characterization of enzymatic supports by TEM, SEM, FT-IR, AFM and DLS
- Preparation and characterization of chitosan bioplastics
- Synthesis and characterization of melanin polymers using FT-IR, UV-Visible and EPR
- Use of EPR (X-band and Q-band) in continuous wave (CW) and pulse
- Antioxidant activity analysis by UV-Visible and EPR

2019 **24 CFU – DM 616/2017 for teaching in high school**
University of Siena - Siena (SI)

- CHIM/03 Didattica della chimica
- M-PED/03 Approcci metodologici e tecnologici per la didattica
- M-PED/04 Teoria e modelli di progettazione, monitoraggio e valutazione scolastica
- M-PSI/01 Teorie e metodi dell'apprendimento

2018 **Qualification for the profession of Pharmacist**
University of Siena – Siena (SI)

2012 - 2017 **Graduation Degree in Pharmacy (LM13)**
University of Siena – Siena (SI)

Feb. 2017 – Oct. 2017 **Thesis Internship in Organic Chemistry**
University of Siena - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI)
Prof. Maurizio Taddei - Prof. Elena Petricci
Thesis title: "Sviluppo e sintesi di 8-idrossichinoline polifunzionalizzate a potenziale attività antitumorale"

- Use of instruments for molecular characterization (NMR, mass spectroscopy)
- Use of separation techniques (Chromatography, filtration and extraction)
- Retrosynthetic approach
- Microwave assisted synthesis

ABROAD EXPERIENCE

Jun. 2019 – Oct. 2019 **Visiting PhD student - Aalto University**
Chemical Engineering–Department of Bioproducts and Biosystems – Espoo, Finland
Prof. Monika Österberg

- Physic-chemical characterization of materials (AFM, TEM, QCM-D, DLS, ζ-potential, FT-IR e UV-Visible)
- New synthetic approaches for magnetic nanoparticles Fe_3O_4 preparation
- Magnetic nanoparticle Fe_3O_4 coating with lignin

TEACHING ACTIVITY

Jun. 2022 **Laboratory Session for Emory Summer School**
University of Siena - Department of Biotechnology, Chemistry and Pharmacy - Siena (SI)
"From crustaceous shells to innovative packaging materials"

2018 – 2020 **Tutor for DBCF Students and project POT DBCF-2019**
University of Siena - Department of Biotechnology, Chemistry and Pharmacy (DBCF) - Siena (SI)

- Organic chemistry lecture for pharmacist students
- Inorganic chemistry and stoichiometry lecture for CTF students

LAB TUTORING ACTIVITY

2023 **Co-Supervisor –** Alessandra Sinibaldi **–** Bachelor's degree in Chemical Sciences – University of Siena - Italy

2022 **Co-Supervisor –** Magdalena Czemierska **–** Researcher– Maria Curie-Sklodowska University, Lublin – Poland
Co-Supervisor – Syahputra Wibowo **–** Visiting PhD student – Brawijaya University, Malang – Indonesia

2019 **Co-Supervisor –** Catia Nicoletti **–** Bachelor's degree in Chemical Sciences – University of Siena - Italy

2018

Co-Supervisor – Iason Efraimidis –Traineeship Erasmus +– University of Athens -Greece
Co-Supervisor – Peter Elias Kidibule **–** Visiting PhD student – CSIC-UAM Universidad Autonoma de Madrid - Centro de Biologia Molecular Severo Ochoa (CBM) - Spain
Co-Supervisor – Joaquin Ramirez **–** Visiting PhD student – UNAM Universidad Nacional Autonoma de México - Mexico

SKILLS

Technical skills and competences

- Physico-Chemical Characterization of biomaterials
Molecular and structural analysis: Fourier Transform Infrared (FT-IR) spectroscopy, UV-Visible spectroscopy, Nuclear Magnetic Resonance (NMR), Electron Paramagnetic Resonance (EPR) and mass spectrometry.
Morphology and size characterization: Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Electron Microscope (SEM).
Size and surface charge analysis: Dynamic Light Scattering (DLS) - ζ-potential and Zeta sizer.
Interaction studies: Quartz Crystal Microbalance with Dissipation monitoring (QCM-D).
Antioxidant activity using EPR and UV-Visible

- Production of new biomaterials
Enzymatic synthesis of melanin-like pigments.
Production of bioplastic chitosan biobased.
Extraction and purification of new biomaterials from waste

- Enzymatic immobilization
Immobilization of enzymes with different catalytic mechanisms.
Production and characterization of supports for enzymatic immobilization (magnetic nanoparticles and chitosan beads).
Use and comparison of different methods of enzymatic immobilization (covalent and adsorption).
Test activity and stability of immobilized enzyme.
Characterization of products formed by enzymatic immobilization.

Language skills
Italian (mother tongue)
English

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken Interaction	Spoken Production	
B2	B2	B2	B2	B2

Computer skills

26.03.2012

ECDL (European Computer Driving Licence)
Excellent knowledge of Microsoft Office (Word, Excel, Power Point).
Good competences for scientific programs (MatLab and EasySpin, Mendeley, Origin, GraphPad, Prism and Chem Draw Ultra)

Driving Licence

A1, B

Personal skills

Strong interpersonal skills, strategic thinking, problem solver, creative, superior attention to detail, time management, highly organized and efficient.

Interests

Travelling and discovering different cultures, joining club or social activities. Dancing and listening music.

LIST OF PUBLICATIONS

- Wibowo, S.; **Costa, J.**; Baratto, M.C.; Pogni; R.; Widyarti, S.; Sabarudin, A.; Matsuo, K.; Sumitro, S.B. Quantification and improvement of the dynamics of human serum albumin and glycated human serum albumin with astaxanthin/astaxanthin-metal ion complexes: physico-chemical and computational approaches. *Int. J. Mol. Sci.* **2022**, *23*, 4771.

- Al Khatib, M.; **Costa, J.**; Spinelli, D.; Capecchi, E.; Saladino, R.; Baratto, M.C.; Pogni, R. Homogentisic Acid and Gentisic Acid biosynthesized pyomelanin mimics: structural characterization and antioxidant activity. *Int. J. Mol. Sci.* **2020**, *22*, 1739.

- Kidibule, P.E.; **Costa, J.**; Atrei, A.M.; Plou, F.J.; Fernández-Lobato, M.; Pogni, R. Production and characterization of chitooligosaccharides by the fungal chitinase Chit42 immobilized on magnetic

nanoparticles and chitosan beads: selectivity, specificity and improved operation utility. *RSC Adv.* **2020**, *11*, 5529.

- Al Khatib, M.; **Costa, J.**; Baratto, M.C.; Basosi, R.; Pogni, R. Paramagnetism and Relaxation Dynamics in Melanin Biomaterials. *J. Phys. Chem. B.* **2020**, *124*, 2110-2115.

- Al Khatib, M.; Harir, M.; **Costa, J.**; Baratto, M.C.; Schiavo, I.; Trabalzini, L.; Pollini, S.; Rossini, G. M.; Basosi, R.; Pogni, R. Spectroscopic Characterization of Natural Melanin from a *Streptomyces cyaneofuscatus* Strain and Comparison with Melanin Enzymatically Synthesized by Tyrosinase and Laccase. *Molecules* **2018**, *23,* 1916.

AWARDS

Nov. 2018 **Best Poster Award – Preparation and characterization of laccase immobilized into magnetic nanoparticles Fe_3O_4 –** PhD day in Chemical and Pharmaceutical Sciences – University of Siena - Department of Biotechnology, Chemistry and Pharmacy.

ORAL PRESENTATIONS

- Social-Life Cycle Assessment (S-LCA) of FISH4FISH project **Costa, J.** Project meeting FISH4FISH – 25 October 2022, Vigo, Spain.

- Magnetic nanoparticles Fe_3O_4 for enzymatic immobilization **Costa, J.** Atrei, A.; Pogni, R. Interregional meeting of the Italian Chemical Society – Section Toscana, Umbria, Marche and Abruzzo (TUMA 2022), September 1-2 2022, Perugia, Italy.

- Innovative packaging materials from fish chitinolytic biowastes **Costa, J.**, Merck Young Chemists' Symposium 2021, 22-24 November 2021, Rimini, Italy.

- Active packaging materials from fish wastes **Costa, J.**, School of Physical Chemistry 2021 – Supramolecular interactions in biological systems, 15-24 June 2021, On-line.

- Biosynthesis and characterization of pyomelanin mimics**, Costa, J.**, DBCF (Divulgare Brevemente Con Forza) 29 April 2021, On-line.

FLASH PRESENTATIONS

- Comparison of two different synthetic routes of magnetic Fe_3O_4 nanoparticles for enzymatic immobilization **Costa, J.**; Baratto, M.C.; Atrei, A. M.; Österberg, M.; Pogni, R. 3° Workshop I chimici per le biotecnologie, 13-14 February 2020, Università degli Studi di Napoli Federico II, Naples, Italy.

POSTER PRESENTATIONS

- Spectroscopic characterization of biosynthesized melanins: a structural dynamical and antioxidant activity insight through EPR Baratto, M.C.; Al Khatib, M.; **Costa, J.**; Pogni, 10th edition of Oxizymes conference, 5-8 July 2022, Siena, Italy.

- Magnetic nanoparticles for laccase immobilization: different behavior with different reducing substrates **Costa, J.**; Atrei, A.; Pogni, 10th edition of Oxizymes conference, 5-8 July 2022, Siena, Italy.

- Use and characterization of free or immobilised enzymatic systems for the synthesis and functionalisation of new materials **Costa, J.**; Atrei, A. M.; Pogni, R. XXVII Congresso nazionale della società chimica italiana "SCI2021", 14-23 September 2021, on-line.

- Comparison of two different synthetic routes of magnetic Fe_3O_4 nanoparticles for enzymatic immobilization **Costa, J.**; Baratto, M.C.; Atrei, A. M.; Österberg, M.; Pogni, R. 3° Workshop I chimici per le biotecnologie, 13-14 Febbrary 2020, Università degli Studi di Napoli Federico II, Napoli, Italy.

- Immobilization of chitinase chit42 on chitosan beads and magnetic nanoparticles for chitooligosaccharides production Kidibule, P. E.; **Costa, J.**; Jiménez-Ortega, E.; Meguez Rodríguez, N.; Ortega Martínez, P.; Plou, F. J.; Sanz-Aparicio, J.; Pogni, R.; Fernández-Lobado, M. Biotec-Congreso nacional de biotecnologia, 10-13 June 2019, Universida de Vigo, Vigo, Spain.

- Immobilization of *Trametes versicolor* Laccase using modifield magnetic Fe_3O_4 nanoparticles: synthesis, characterization and use **Costa, J.**; Baratto, M.C.; Atrei, A. M.; Pogni, R. 2° Workshop I chimici per le biotecnologie, 22 Febbrary 2019, Università degli studi di Milano, Milan, Italy.

- Preparation and characterization of laccase immobilized into magnetic nanoparticles Fe_3O_4 **Costa, J.**; Baratto, M.C.; Atrei, A. M.; Pogni, R. Interregional meeting of the Italian Chemical Society – Section Toscana, Umbria, Marche and Abruzzo (TUMA 2018), 4-5 October 2018, Centro Congressi Le Benedettine, Pisa, Italy.

- Characterization of natural melanin from *Streptomyces cyaneofuscatus* spp. and its comparison with the enzymatically synthesized melanin by tyrosinase and laccase Pogni, R.; Al Katib, M.; Harir, M.; **Costa, J.**; Baratto, M.C.; Basosi, R. Oxizymes Conference 2018, 8-10 July 2018, Queen's University Belfast, Northern Ireland.

- Magnetic nanoparticles for oxidative enzyme immobilization: comparison of different synthetic routes and substrate reactivity **Costa, J.**; Baratto, M.C.; Giacomini, D.; Atrei, A. M.; Pogni, R. Emory-Unisi summer school 15th edition, 30 May 2018, Polo Didattico San Miniato, Università degli studi di Siena, Siena, Italia.

PARTICIPATION TO SCHOOLS

- School GIRSE 2022 – Gruppo Italiano di Risonanza di Spin Elettronico
September 19-22 2022, Padova, Italy.

- School of Physical Chemistry 2021 – Supramolecular interactions in biological systems
15-24 June 2021, On-line.

ORGANIZATIONS OF CONFERENCE

5-8.07.2022 **10th Edition of the International OxiZymes Conference**
Organizing Committee

PARTICIPATION TO TELEVISION PROGRAMS

As fellowship recipient of FISH4FISH project, I was requested to participate in a dedicated episode of Sky Nature where the results of the project were extensively highlighted:
- Effetto terra - guida pratica per terrestri consapevoli - SKY Nature. Conducted by Francesca Michielin, it addresses issues related to the environment. Participation in the 6th episode "L'involucro del Mondo" concerning plastic pollution, broadcast on 10th April 2022.

- Officina Italia – TGR - RAI 3. As part of an episode dedicated to the circular economy and new materials, broadcast on 22nd February 2022.

MEMBERSHIPS

- Società Chimica Italiana - Divisione di Chimica Fisica
- CSGI (Consorzio Interuniversitario per lo sviluppo dei Sistemi a Grande Interface – Center for Colloid and Surface Science)
- GIRSE – Group for Electron Spin Resonance
- **Pint of Science** – Siena

Siena, 28.04.2023 **Signature**_____

Ai sensi degli artt. 46 e 47 del D.P.R. 445/2000 e s.m.i., attesto la veridicità di quanto dichiarato. Autorizzo il trattamento dei dati personali presenti nel mio curriculum vitae ai sensi dell'art. 13 del D. Lgs 30 giugno 2003, n. 196 "Codice in materia di protezione dei dati personali" e dell'art. 13 del GDPR (Regolamento UE 2016/679)