

CURRICULUM VITAE – LORENZO DEGLI ESPOSTI, PH. D.

PERSONAL INFORMATION

Date of birth: 24/01/1992
Place of birth: Bologna (BO)
Citizenship: Italian
E-mail address: lorenzo.degliesposti@istec.cnr.it
Researcher unique identifier: ORCID: 0000-0002-6596-560X



SKILLS

Expert postdoctoral researcher in the fields of biomaterials, nanomaterials, biomineralization, bioceramics, and in the design and tailoring of inorganic nanoparticles for application in medicine, agriculture, cosmetics, and environment. Current research focus is the development of calcium phosphate nanoparticles functionalized with drugs, organic molecules, and biomolecules (in particular peptides, siRNAs, miRNAs) with tailored physicochemical properties.

Soft skills:

- Proficient scientific communicator, with several awards for best written and oral presentations.
- Strong knowledge of scientific language and how to present research results, with more than 30 scientific publications over 5 years of research activity – 30% of those as first author.
- Capable of working in international research teams for high-budget interdisciplinary projects.
- Good knowledge of grant proposal writing, with collaboration in preparing national and international grant proposals.

CURRENT WORK POSITION

November 2019 – current date:

Post-Doc Research fellow at the Institute of Science and Technology for Ceramics - National Research Council of Italy (ISTEC-CNR)

Research Field: Development of tailored calcium phosphate nanoparticles for application in medicine, agriculture, environment, and industry. Study of biomineralization processes and development of biomimetic materials and nanomaterials. Specialization in inorganic nanomaterials synthesis and characterization, material interaction with drugs, organic molecules, and biomolecules (peptides, siRNAs, miRNAs), crystallography, and vibrational spectroscopy.

Address: Via Granarolo 64, 48018 - Faenza (RA), Italy

Website: www.istec.cnr.it

PROFESSIONAL AND RESEARCH EXPERIENCE

2021 – current date

Key personnel of EU “UNAT” project. Project ID: 101008159. Project Coordinator: Dr. Claude Bernard. Focus: Development of fluorescent carbon dot nanoparticles from biowastes. Description: design of highly-fluorescent carbon dot nanoparticles by thermal treatment of vegetal biowastes.

2020 – current date

Key personnel of “Stimulation of exosomes from stem cells by engineered calcium phosphate nanoparticles for their use as drug nano-carriers” project, CNR/MoST Agreement (Italy/Taiwan). Project Coordinator: Dr. Michele Iafisco. Focus: Development of hybrid calcium phosphate/iron oxide nanoparticles for exosome stimulation. Description: design of magnetic core-shell calcium phosphate @ iron oxide nanoparticles with high biocompatibility and cell internalization for the stimulated production of cell exosomes.

2019 – current date

Key personnel of EuroNanoMed III “RUNNING” project. Project Coordinator: Dr. Silvio Danese. Focus: Development of calcium phosphate nanoparticles for gut drug delivery of therapeutic siRNAs. Description: design of tailored calcium phosphate nanoparticles functionalized with therapeutic siRNAs for the treatment of Crohn's disease.

2019 – 2020

Key personnel of “Biocompatible and inhalable antimicrobial-loaded nanoparticles for the counteraction of biofilm formation and antibiotic resistance: towards a potential new therapy for CF related infections.” project of Fondazione per la Ricerca sulla Fibrosi Cistica – Onlus. Project ID: FFC#20/2018. Project Coordinator: Dr. Maurizio Sanguinetti. Focus: Development of calcium phosphate nanoparticles for drug delivery of antibacterial agents for the treatment of cystic fibrosis. Description: design of tailored calcium phosphate nanoparticles functionalized with therapeutic drugs and peptides for the treatment of cystic fibrosis.

2019

Visiting Researcher at Friedrich-Alexander University of Erlangen-Nurnberg. Supervisor: Prof. Aldo R. Boccaccini. Focus: development of calcium phosphate-bioactive glass composite materials for dental remineralization and drug delivery.

2016 – 2019

Key personnel of European Research and Innovation Staff Exchange “VIVOIMAG” project. Project ID: 654757. Project Coordinator: Dr. George Loudos. Focus: In vivo study of the fate of calcium phosphate nanoparticles after administration through inhalation and injection. Description: design of tailored calcium phosphate nanoparticles functionalized with radioactive probes for *in vivo* imaging.

2018

Principal Investigator of synchrotron light SAXS data collection at ELETTRA synchrotron (Italy). Project ID: 20175403. Focus: In situ, real time study of the crystallization of calcium phosphate nanoparticles in presence of template molecules. Description: real time investigation of the formation of calcium phosphate nanoparticles in presence of template molecules in order to control their physicochemical properties for biomedical application.

2016 – 2019

Key personnel of industrial R&D project. New formulations for the development of dental products based on biomimetic calcium phosphate micro-nanoparticles. Company: Curasept a.d.s. s.r.l. (Protocol CNR ISTE C N. 0001434 date 09/05/2016).

2016 – current date

Key personnel of industrial R&D analyses. Execution of elemental and physicochemical characterization of ion-doped calcium phosphate products for third parties. Company: Kalichem Italia s.p.a..

- 2016 – 2020 **Key personnel of EU H2020 “CUPIDO” project.** Project ID: 720834. Project Coordinator: Dr. Daniele Catalucci. Focus: Development of calcium phosphate nanoparticles for cardiac drug delivery. Description: design of tailored calcium phosphate nanoparticles functionalized with therapeutic drugs, peptides, and RNAs for the treatment of cardiovascular diseases. Supervision of scale up of the production process up to pre-industrial scale. Collaboration in product design and *in vivo* testing.
- 2016 – 2019 **Ph. D. student** at the Institute of Science and Technology for Ceramics - National Research Council of Italy (ISTEC-CNR). Supervisor: Dr. Michele Iafisco, Dr. Monica Sandri. Focus: Development of calcium phosphate nanoparticles for medicine. Description: design of tailored calcium phosphate nanoparticles functionalized with therapeutic drugs, peptides, and RNAs as well as biologically relevant ions for the treatment of cardiovascular diseases and dental disease. Base research on the physicochemical properties of calcium phosphate nanoparticles, their formation, and how to design tailored nanoparticles.

EDUCATION AND TRAINING

- 2016 – 2019 **Ph. D. in Materials Science and Technology** (XXII cycle), University of Parma.
Thesis title: *Tailoring Calcium Phosphate Nanoparticles For Medical Applications: A Functional By Design Approach*. Final evaluation: Excellent.
Additional title of “Doctor Europaeus” for performing the Ph.D. program in an international context.
- 2019 **School and Conference on Analysis of Diffraction Data in Real Space**, Institute Laue-Langevin (ILL).
- 2018 **Summer School on “Scattering Methods applied to Soft Matter”**, University of Montpellier.
- 2017 **Summer School “To.Sca.Lake 2.0”**, Lake Como School of Advances Studies.
- 2014 – 2016 **M. Sc. in Photochemistry and Molecular Materials**, University of Bologna. Final evaluation: 110/110 cum Laude.
- 2011 – 2014 **B. Sc. in Chemistry and Materials Chemistry**, University of Bologna. Final evaluation: 110/110 cum Laude.

LANGUAGE SKILLS

- Italian: Native speaker
- English: Proficient user (C1)

TEACHING EXPERIENCE

- 2015 – 2016 **Teaching Tutor** of B. Sc. in Chemistry and Materials Chemistry, University of Bologna.
- 2014 – 2016 **Didactic laboratory assistant** - part-time collaboration, University of Bologna.
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PRIZES AND AWARDS

- 2022 **Second place** in the National Competition “GiovedìScienza” for young researchers.
- 2021 **Special Prize “Elena Benaduce”** for the best research work for health and wellbeing within the National Competition “GiovedìScienza” for young researchers.
- 2021 **Third place** in the National Competition “GiovedìScienza” for young researchers.
- 2019 **Best Poster Award** for young researchers at the 30° Congress of the European Society for Biomaterials “ESB2019”.
- 2019 **Mobility grant** by the Trust of Journal of European Ceramic Society (ID: 2019209).
- 2018 **Grant for synchrotron light SAXS data collection** by CERIC consortium (ID: 20175403).
- 2017 **Rotary prize for the best Master’s degree** within the School of Science of the University of Bologna.
- 2013 – 2016 **Merit Award of the University of Bologna** for excellent students (4 consequential awards).

EDITORIAL ACTIVITIES

2018 – current date:

Reviewer for international Journals as ACS Biomaterials Science & Engineering, Bioactive Materials, Biomaterials Science, Biomimetics, Crystals, Drug Development and Industrial Pharmacy, Journal of Colloid and Interface Science, Materials Letters, Materials, Scientific Reports.

INVITED ORAL PRESENTATIONS AND CONGRESSES PARTECIPATIONS

- 29/08/2019 **Seminar on Research Activity** at Friedrich-Alexander University of Erlangen-Nurnberg. Host: Prof. Aldo R. Boccaccini. Title: “ISTEC CNR Bioceramics and Bio-Hybrid Composites Group: calcium phosphates from nanoparticles to organized hierarchical 3-dimensional scaffolds”
- 04/04/2019 **Invited talk** at “TRACE-2: Tissue Regeneration: Advanced Ceramics and Composites” congress. Host: Prof. Aldo R. Boccaccini, Prof. Rainer Gadow. Title: “Citrate-stabilized amorphous calcium phosphate doped with fluoride ions: a new biomimetic nanomaterial in dentistry”

2017 – current date:

More than 8 oral presentations and more than 5 poster presentations at national and international congresses, including the International Bioceramics Conference, International Congress of European Biomaterials society, National Congress of Italian Biomaterials society, National Congress of Italian Chemistry society, and the International “Biomaterials and Novel Technologies for Healthcare” Conference.

PUBLICATIONS – BIBLIOMETRIC PARAMETERS

Number of publications:	36 (10 as first author)
Book Chapters:	2
h-index:	11
Total Citations:	551

LIST OF PUBLICATIONS IN EXTENSO

IN INTERNATIONAL PEER-REVIEWED JOURNALS AND BOOK CHAPTERS

1. Casado, G. E., Ivanchenko, P., Paul, G., Bisio, C., Marchese, L., Ashrafi, A. M., Milosavljevic, V., **Degli Esposti, L.**, Iafisco, M., Mino, L. Surface and structural characterization of Cu-exchanged hydroxyapatites and their application in H₂O₂ electrocatalytic reduction. *Applied Surface Science*, **2022**, 595, 153495.
2. Iafisco, M.; Carella, F.; **Degli Esposti, L.**; Adamiano, A.; Catalucci, D.; Modica, J.; Bragonzi, A.; Vitali, A.; Torelli, R.; Sanguinetti, M.; Bugli, F. Biocompatible antimicrobial colistin loaded calcium phosphate nanoparticles for the counteraction of biofilm formation in cystic fibrosis related infections. *Journal of Inorganic Biochemistry* **2022**, 230, 111751.
3. Ionescu, A.C.; **Degli Esposti, L.**; Iafisco, M.; Brambilla, E. Enamel Remineralization and Dentine Tubules Occlusion by Bioactive Formulations Based on Ion-Doped Nanohydroxyapatite and Precursor Nanoparticles. *Scientific Reports* **2022**, 12, 1-16.
4. Gómez-Morales, J.; Fernández-Penas, R.; Acebedo-Martínez, F.J.; Romero-Castillo, I.; Verdugo-Escamilla, C.; Choquesillo-Lazarte, D.; **Degli Esposti, L.**; Jiménez-Martínez, Y.; Fernández-Sánchez, J.F.; Iafisco, M.; Boulaiz, H. Luminescent Citrate-Functionalized Terbium-Substituted Carbonated Apatite Nanomaterials: Structural Aspects, Sensitized Luminescence, Cytocompatibility, and Cell Uptake Imaging. *Nanomaterials*, **2022**, 12, 1257.
5. **Degli Esposti, L.**; Iafisco, M. Amorphous calcium phosphate, the lack of order is an abundance of possibilities. *Biomaterials and Biosystems* **2022**, 5, 100037.
6. **Degli Esposti, L.**; Ionescu, A. C.; Carella, F.; Adamiano, A.; Brambilla, E.; Iafisco, M. Antimicrobial Activity of Remineralizing Ion-Doped Amorphous Calcium Phosphates for Preventive Dentistry. *Frontiers in Materials* **2022**, 9, 846130.
7. Barghi, A.; **Degli Esposti, L.**; Iafisco, M.; Adamiano, A.; Casado, G. E.; Ivanchenko, P.; Mino, L.; Yoon, H. Y.; Joe, E.-N.; Jeon, J.-R.; Chang, Y. S. Microbial Volatile Organic Compound (VOC)-Driven Dissolution and Surface Modification of Phosphorus-Containing Soil Minerals for Plant Nutrition: An Indirect Route for VOC-Based Plant–Microbe Communications. *Journal of Agricultural and Food Chemistry*, **2021**, 69, 14478-14487.
8. Quarta, E.; Sonvico, F.; Bettini, R.; De Luca, C.; Dotti, A.; Catalucci, D.; Iafisco, M.; **Degli Esposti, L.**; Colombo, G.; Trevisi, G.; Rekkas, D. M.; Rossi, A.; Wong, T. W.; Buttini, F.; Colombo P. Dry Powder Inhaler of Calcium Phosphate Nanoparticles for Heart Targeting: The Experimental Design of the Powder for Inhalation *Pharmaceutics* **2021**, 13, 1825.

9. Carella, F.; **Degli Esposti, L.**; Adamiano, A.; Iafisco, M. The Use of Calcium Phosphates in Cosmetics, State of the Art and Future Perspectives. *Materials* **2021**, *14*, 6398.
10. **Degli Esposti, L.**; Markovic, S.; Ignjatovic, N.; Panseri, S.; Montesi, M.; Adamiano, A.; Fosca, M.; Rau, J. V.; Uskokovic, V.; Iafisco, M. Thermal crystallization of amorphous calcium phosphate combined with citrate and fluoride doping: a novel route to produce hydroxyapatite bioceramics. *J. Mater. Chem. B* **2021**, *9*, 4832-4845.
11. Tampieri, A.; Sandri, M.; Iafisco, M.; Panseri, S.; Montesi, M.; Adamiano, A.; Dapporto, M.; Campodoni, E.; Dozio, S. M.; **Degli Esposti, L.**; Sprio, S. Nanotechnological approach and bio-inspired materials to face degenerative diseases in aging. *Aging Clin Exp Res* **2021**, *33*, 805–821.
12. **Degli Esposti, L.**; Adamiano, A.; Siliqi, D.; Giannini, C.; Iafisco, M. The effect of chemical structure of carboxylate molecules on hydroxyapatite nanoparticles. A structural and morphological study. *Bioactive materials* **2021**, *6*, 2360-2371.
13. Carella, F.; Seck, M.; **Degli Esposti, L.**; Diadiou, H.; Maienza, A.; Baronti, S.; Vignaroli, P.; Vaccari, F.P.; Iafisco, M.; Adamiano, A. Thermal conversion of fish bones into fertilizers and biostimulants for plant growth—A low tech valorization process for the development of circular economy in least developed countries. *Journal of Environmental Chemical Engineering* **2021**, *9*, 104815.
14. Ideia, P.; **Degli Esposti, L.**; Miguel, C.C.; Adamiano, A.; Iafisco, M.; Castilho, P.C. Extraction and characterization of hydroxyapatite-based materials from grey triggerfish skin and black scabbardfish bones. *International Journal of Applied Ceramic Technology* **2021**, *18*, 235-243.
15. Barbanente, A.; Palazzo, B.; **Degli Esposti, L.**; Adamiano, A.; Iafisco, M.; Ditaranto, N.; Migoni, D.; Gervaso, F.; Nadar, R.; Ivanchenko, P. Selenium-doped hydroxyapatite nanoparticles for potential application in bone tumor therapy. *J. Inorg. Biochem.* **2020**, *215*, 111334.
16. **Degli Esposti, L.**; Dotti, A.; Adamiano, A.; Fabbi, C.; Quarta, E.; Colombo, P.; Catalucci, D.; De Luca, C.; Iafisco, M. Calcium Phosphate Nanoparticle Precipitation by a Continuous Flow Process: A Design of an Experiment Approach. *Crystals* **2020**, *10*, 953.
17. Scialla, S.; Carella, F.; Dapporto, M.; Sprio, S.; Piancastelli, A.; Palazzo, B.; Adamiano, A.; **Degli Esposti, L.**; Iafisco, M.; Piccirillo, C. Mussel Shell-Derived Macroporous 3D Scaffold: Characterization and Optimization Study of a Bioceramic from the Circular Economy. *Marine drugs* **2020**, *18*, 309.
18. **Degli Esposti, L.**; Adamiano, A.; Tampieri, A.; Ramirez-Rodriguez, G.B.; Siliqi, D.; Giannini, C.; Ivanchenko, P.; Martra, G.; Lin, F.-H.; Delgado-López, J.M. Combined effect of citrate and fluoride ions on hydroxyapatite nanoparticles. *Cryst. Growth Des.* **2020**.
19. Yoon, H.Y.; Lee, J.G.; **Degli Esposti, L.**; Iafisco, M.; Kim, P.J.; Shin, S.G.; Jeon, J.-R.; Adamiano, A. Synergistic Release of Crop Nutrients and Stimulants from Hydroxyapatite Nanoparticles Functionalized with Humic Substances: Toward a Multifunctional Nanofertilizer. *ACS omega* **2020**, *5*, 6598-6610.
20. **Degli Esposti, L.**; Ionescu, A.C.; Brambilla, E.; Tampieri, A.; Iafisco, M. Characterization of a Toothpaste Containing Bioactive Hydroxyapatites and In Vitro Evaluation of Its Efficacy to Remineralize Enamel and to Occlude Dentinal Tubules. *Materials* **2020**, *13*, 2928.
21. Nadar, R.A.; Asokan, N.; **Degli Esposti, L.**; Curci, A.; Barbanente, A.; Schlatt, L.; Karst, U.; Iafisco, M.; Margiotta, N.; Brand, M. Preclinical evaluation of platinum-loaded hydroxyapatite nanoparticles in an embryonic zebrafish xenograft model. *Nanoscale* **2020**, *12*, 13582-13594.

22. **Degli Esposti, L.** Tailoring calcium phosphate nanoparticles for medical applications: a functional by design approach. *Doctoral Thesis* **2020**.
23. Barbanente, A.; Nadar, R.A.; **Degli Esposti, L.**; Palazzo, B.; Iafisco, M.; Van Den Beucken, J.J.; Leeuwenburgh, S.C.; Margiotta, N. Platinum-loaded, selenium-doped hydroxyapatite nanoparticles selectively reduce proliferation of prostate and breast cancer cells co-cultured in the presence of stem cells. *Journal of Materials Chemistry B* **2020**, *8*, 2792-2804.
24. Tampieri, A.; Sandri, M.; Iafisco, M.; Panseri, S.; Montesi, M.; Adamiano, A.; Dapporto, M.; Campodoni, E.; Dozio, S.M.; **Degli Esposti, L.** Nanotechnological approach and bio-inspired materials to face degenerative diseases in aging. *Aging clinical and experimental research* **2019**, 1-17.
25. Marchiol, L.; Filippi, A.; Adamiano, A.; **Degli Esposti, L.**; Iafisco, M.; Mattiello, A.; Petrusa, E.; Braidot, E. Influence of hydroxyapatite nanoparticles on germination and plant metabolism of tomato (*Solanum lycopersicum* L.): Preliminary evidence. *Agronomy* **2019**, *9*, 161.
26. Carella, F.; **Degli Esposti, L.**; Barreca, D.; Rizzi, G.A.; Martra, G.; Ivanchenko, P.; Casado, G.E.; Morales, J.G.; López, J.M.D.; Tampieri, A. Role of citrate in the formation of enamel-like calcium phosphate oriented nanorod arrays. *CrystEngComm* **2019**, *21*, 4684-4689.
27. Gómez Morales, J.; Fernández Penas, R.; Verdugo-Escamilla, C.; **Degli Esposti, L.**; Oltolina, F.; Prat, M.; Iafisco, M.; Fernández Sánchez, J. Bioinspired Mineralization of Type I Collagen Fibrils with Apatite in Presence of Citrate and Europium Ions. *Crystals* **2019**, *9*, 13.
28. Iafisco, M.; **Degli Esposti, L.**; Ramírez-Rodríguez, G.B.; Carella, F.; Gómez-Morales, J.; Ionescu, A.C.; Brambilla, E.; Tampieri, A.; Delgado-López, J.M. Fluoride-doped amorphous calcium phosphate nanoparticles as a promising biomimetic material for dental remineralization. *Sci. Rep.* **2018**, *8*, 17016.
29. **Degli Esposti, L.**; Carella, F.; Adamiano, A.; Tampieri, A.; Iafisco, M. Calcium phosphate-based nanosystems for advanced targeted nanomedicine. *Drug Dev. Ind. Pharm.* **2018**, *44*, 1223-1238.
30. Miragoli, M.; Ceriotti, P.; Iafisco, M.; Vacchiano, M.; Salvarani, N.; Alogna, A.; Carullo, P.; Ramirez-Rodríguez, G.B.; Patrício, T.; **Degli Esposti, L.** Inhalation of peptide-loaded nanoparticles improves heart failure. *Science translational medicine* **2018**, *10*, ean6205.
31. Setua, S.; Jaggi, M.; Yallapu, M.M.; Chauhan, S.C.; Danilushkina, A.; Lee, H.; Choi, I.S.; Fakhrullin, R.; **Degli Esposti, L.**; Tampieri, A. Targeted and theranostic applications for nanotechnologies in medicine. In *Nanotechnologies in Preventive and Regenerative Medicine*, Elsevier: 2018; pp. 399-511.
32. **Degli Esposti, L.**; Carella, F.; Iafisco, M. Inorganic nanoparticles for theranostic use. In *Electrofluidodynamic Technologies (EFDTs) for Biomaterials and Medical Devices*, Elsevier: 2018; pp. 351-376.
33. Bianchi, M.; **Degli Esposti, L.**; Ballardini, A.; Liscio, F.; Berni, M.; Gambardella, A.; Leeuwenburgh, S.C.; Sprio, S.; Tampieri, A.; Iafisco, M. Strontium doped calcium phosphate coatings on poly(etheretherketone)(PEEK) by pulsed electron deposition. *Surf. Coat. Technol.* **2017**, *319*, 191-199.
34. Orlandini, G.; Ragazzon, G.; Zanichelli, V.; **Degli Esposti, L.**; Baroncini, M.; Silvi, S.; Venturi, M.; Credi, A.; Secchi, A.; Arduini, A. Plugging a bipyridinium axle into multichromophoric calix [6] arene wheels bearing naphthyl units at different rims. *ChemistryOpen* **2017**, *6*, 64.
35. Shemchuk, O.; **Degli Esposti, L.**; Grepioni, F.; Braga, D. Ionic co-crystals of enantiopure and racemic histidine with calcium halides. *CrystEngComm* **2017**, *19*, 6267-6273.

36. Braga, D.; **Degli Esposti, L.**; Rubini, K.; Shemchuk, O.; Grepioni, F. Ionic Cocrystals of Racemic and Enantiopure Histidine: An Intriguing Case of Homochiral Preference. *Cryst. Growth Des.* **2016**, *16*, 7263-7270.

In compliance with the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize the recipient of this document to use and process my personal details for the purpose of recruiting and selecting staff and I confirm to be informed of my rights in accordance to art. 7 of the above mentioned decree.

Luca Degli Esposti