

Dr. Nicole Zoratto

Born in Latina, Italy

Email: nicole.zoratto@pharma.ethz.ch

Language: Italian (native)
English (fluent)



RESEARCH EXPERIENCE

Research field: Drug Delivery, Tissue engineering, Hydrogels, Nanoparticles, Microfluidics.

ETH Zürich, Institute of Pharmaceutical Science, Switzerland.

Postdoctoral Researcher.

08/2021-today

Project: Bioinspired, low-cost device for minimally invasive blood sampling.

Supervisor: Professor Jean-Christophe Leroux.

Funded by: Botnar Research Center for Child Health (2021).

Sapienza University of Rome, Italy.

Postdoctoral Researcher.

02/2020-07/2021

Project: Hyaluronan-Cholesterol Nanogels for the Enhancement of the Ocular Delivery of Therapeutics.

Supervisor: Professor Pietro Matricardi.

California NanoSystems Institute (CNSI) at UCLA, Los Angeles, USA.

Visiting Ph.D.

11/2018-08/2019

Project: Microfluidic-assisted particle formations for tissue engineering applications.

Supervisor: Professor Ali Khademhosseini.

Funded by Sapienza fellowship.

Sapienza University of Rome, Italy.

Ph.D Student

11/2016-10/2018

Project: Polysaccharide-based hydrogels for tissue engineering applications.

Supervisor: Professor Pietro Matricardi.

King's College London, Institute of Pharmaceutical Science, London, UK.

Visiting Master Student.

03/2015-11/2015

Project: Formulation of *in situ* gels composed of self-assembling surfactants and hydrophobically modified polymers.

Supervisor: Cécile A. Dreiss.

Funded by Sapienza fellowship.

EDUCATION

Ph.D. in Pharmaceutical Sciences.

12/2019

Sapienza University of Rome, Italy.

State Examination and License to Practice Pharmacy.

12/2016

Sapienza University of Rome, Italy.

Graduation in Pharmaceutical Chemistry and Technology.

01/2016

Sapienza University of Rome, Italy.

Graduated with a maximum score of 110/110 with honors.

TECHNICAL SKILLS

Core research skills:

- Development of drug delivery systems and soft scaffolds for tissue engineering applications.

Complementary skills:

- Functionalization of polymers (i.e. polysaccharides) with small molecules: esterification reactions and click chemistry strategies.
- Microfluidics: development of polymeric microparticles.
- Polymer and nanoparticle characterization: gel permeation chromatography (GPC), dynamic light scattering (DLS), nuclear magnetic resonance (NMR), thermal analysis (TGA, DSC).
- Characterization of polymer-based solutions and hydrogels: Rheology, dynamo-mechanical analyses and fluorescence microscopy (porosity studies).
- CAD design and 3D-printing: DLP, FDM and bio-injection printing.
- Characterization of organic molecules: High-performance liquid chromatography (HPLC), fluorescence spectroscopy, UV-VIS and FT-IR spectroscopy.
- Electron microscopy characterization of microneedles and 3D-printed scaffolds: SEM and VP-SEM.
- Cell biology: Cell culture, cell viability assays, intracellular trafficking and staining, confocal microscopy.

Software skills:

- | | |
|---------------------------------------|----------------------|
| ▪ Microsoft Office. | ▪ ChemDraw. |
| ▪ Adobe Photoshop, Adobe Illustrator. | ▪ CorelDraw. |
| ▪ Origin. | ▪ SolidWorks. |
| ▪ GraphPad. | ▪ Blender (basics). |
| ▪ Leica LAS-X, ImageJ. | ▪ EndNote, Mendeley. |

ORGANIZATIONAL SKILLS

- Project management and Collaboration maintenance.
- Tutor of undergraduate and Ph.D.students.
- Paper and grant writing.
- Good communication and Problem-solving.
- Critical thinking, Active listening and Empathy.
- Teamwork, Efficiency and High motivation.

SCIENTIFIC COLLABORATIONS

- Botnar Research Center for Child Health (BRCCH), Switzerland.
- King's College London, UK.
- Terasaki Institute, Los Angeles, USA.

AWARDS & FELLOWSHIPS

- IPW Young Scientist Lecture 2023 (Award, ETH Zurich)
- Postdoctoral Excellence Programme (2021)

PUBLICATIONS

Research Articles

1. Krivitsky V., Krivitsky A., Mantella V., Greenwald M.B.Y., Siva sankar D., Betschmann J., Bader J.J., **Zoratto N.**, Dengjel J., Werner S., Leroux J.C., Ultra-fast and controlled capturing, loading, and release of extracellular vesicles by a portable microstructured electrochemical fluidic device. *Advanced Materials*, accepted.
2. Zhi L., Klein Cerrejon D., Römer S., **Zoratto N.**, Leroux J.-C., Boosting systemic absorption of peptides with a bioinspired buccal-stretching device. *Science Translational Medicine*, accepted.
3. Paoletti L., **Zoratto N.**, Benvenuto M., Nardozi D., Angiolini V., Mancini P., Masuelli L., Bei R., Frajese G.V., Matricardi P., Nalli M., Di Meo C., Hyaluronan-estradiol nanogels as potential drug carriers to target ER+ breast cancer cell line. *Carbohydrate Polymers*, 314 (2023) 120900.
4. Di Matteo S., Di Meo C., Carpino G., **Zoratto N.**, Cardinale V., Nevi L., Overi D., Constantini D., Pinto C., Montanari E., Marzioni M., Maroni L., Therapeutic effects of dexamethasone-loaded hyaluronan nanogels in the experimental cholestasis. *Drug Delivery and Translational Research*, 12 (2022) 1959-1973.
5. Coviello T., Alahique F., Di Meo C., Matricardi P., Montanari E., **Zoratto N.**, Grassi M., Abrami M., Scleroglucan and guar gum: The synergistic effects of a new polysaccharide system. *Express Polymer Letters*, 16 (2022) 410-426.
6. **Zoratto N.**, Forcina L., Matassa R., Mosca L., Familiari G., Musaro' A., Mattei M., Coviello T., Di Meo C., Matricardi P., Hyaluronan-cholesterol nanogels for the enhancement of the ocular delivery of therapeutics. *Pharmaceutics*, 13 (2021) 1781.
7. Stagno V., Genova C., **Zoratto N.**, Favero G., Capuani S., Single-sided portable nmr investigation to assess and monitor cleaning action of PVA-borax hydrogel in travertine and lecce stone. *Molecules*, 26 (2021) 3697.
8. Franco S., Buratti E., Ruzicka B., Nigro V., **Zoratto N.**, Matricardi P., Angelini R., Volume fraction determination of microgel composed of interpenetrating polymer networks of PNIPAM and Polyacrylic Acid. *Journal of Physics: Condensed Matter*, 33 (2021) 174004.
9. **Zoratto N.**, Di Lisa D., de Rutte J., Md Nurus S., Silva A. R., Tamayol A., Di Carlo D., Khademhosseini A., Sheikhi A., In situ forming microporous gelatin methacryloyl hydrogel scaffolds from thermostable microgels for tissue engineering. *Bioengineering & Translational Medicine*, 5 (2020) e10180.
10. **Zoratto N.**, Matassa R., Montanari E., Familiari G., Petralito S., Coviello T., Di Meo C., Matricardi P., Glycerol as a green solvent for enhancing the formulation of dextran methacrylate and gellan-based semi-interpenetrating polymer networks. *Journal of Materials Science*, 55 (2020) 1-16.
11. **Zoratto N.**, Grillo I., Matricardi P., Dreiss A. C., Supramolecular gels of cholesterol-modified gellan gum with disc-like and worm-like micelles. *Journal of Colloid and Interface Science*, 556 (2019) 301-312.
12. Montanari E., **Zoratto N.**, Mosca L., Cervoni L., Lallana E., Angelini R., Coviello T., Di Meo C., Matricardi P., Halting hyaluronidase activity with hyaluronan-based particles. Development of smart and versatile injectable materials. *Carbohydrate Polymers*, 221 (2019) 209-220.
13. Manconi M., Manca M.L., Caddeo C., Cencetti C., Di Meo C., **Zoratto N.**, Nacher A., Fadda M. and Matricardi P., Preparation of gellan-cholesterol nanohydrogels embedding baicalin and evaluation of their wound healing activity. *European Journal of Pharmaceutics and Biopharmaceutics*, 127 (2018) 244-249.
14. Musazzi U. M., Cencetti C., Franzè S., **Zoratto N.**, Di Meo C., Procacci P., Matricardi P., and Cilurzo F., Gellan nanohydrogels: novel nano-delivery systems for cutaneous administration of piroxicam. *Molecular Pharmaceutics*, 15 (2018) 1028-1036.
15. **Zoratto N.**, Palmieri F.R., Cencetti C., Montanari E., Di Meo C., Manca M.L., Manconi M. and Matricardi P., Design of hybrid gels based on gellan-cholesterol derivative and P90G liposomes for drug depot applications. *Gels*, 3 (2017) 18.

16. Manzi G., **Zoratto N.**, Matano S., Sabia R., Villani C., Coviello T., Matricardi P. and Di Meo C., “Click” hyaluronan based nanohydrogels as multifunctionalizable carriers for hydrophobic drugs. *Carbohydrate Polymers*, 174 (2017) 706-715.

Review Articles

1. **Zoratto N.**, Montanari E., Viola M., Wang J., Coviello T., Di Meo C., Matricardi P. Strategies to load therapeutics into polysaccharide-based nanogels with a focus on microfluidics: A review. *Carbohydrate Polymers*, 266 (2021) 118119.

Book Chapters

1. **Zoratto N.** and Matricardi P., Semi-IPNs and IPNs based hydrogels. In: “Osteochondral Tissue Engineering: Challenges, Current Strategies, and Technological Advances” by M. Oliveira, S. Pina, R.L. Reis and J.S. Roman, Springer (Series: Advances in Experimental Medicine and Biology), 2018, 155-188.

2. **Zoratto N.** and Matricardi P., Semi-IPNs and IPNs based hydrogels. In: “Polymeric Gels Characterization, Properties and Biomedical Applications” by Kunal Pal, Indranil Banerjee and Gwen Jones, Elsevier, 2018, 91-124.

ORAL & POSTER PRESENTATIONS

Oral Presentations

1. *Hyaluronan-cholesterol nanogels for the enhancement of the ocular delivery of therapeutics*. Nanoscience and Nanotechnology, May 2023, Frascati, Italy.

2. *Bioinspired, low-cost device for minimally invasive blood sampling*, 4th European Conference on Pharmaceutics, March 2023, Marseille, France.

3. *Glycerol as a green solvent for enhancing the formulation of dextran methacrylate and gellan-based semi-interpenetrating polymer networks*. 4th International EPNOE Junior Scientist Conference, February 2021, Kortrijk, Belgium (online).

Poster Presentations

1. Paoletti E., **Zoratto N.**, Coviello T., Matricardi P., Di Meo C., ‘*Hyaluronan-estradiol nanogels as potential drug carriers to target ER+ breast cancer cell line*’ 4th European Conference on Pharmaceutics, March 2023, Marseille, France.

2. Sheikhi A., De Rutte J., Haghniaz R., Akouissi O., **Zoratto N.**, Sohrabi A., Di Carlo D., Khademhosseini A., ‘*Microfluidic-enable bottom-up hydrogels from annealable naturally-derived protein microbeads*’, Reasearch Day, April 2019, Los Angeles, California.

3. Montanari E., **Zoratto N.**, Di Meo C., Coviello T., Mancini P., Mosca L., Matricardi P., ‘*Hyaluronan based nanogels as Trojan Horse: Chasing intracellular pathogens*’, CRS Padova, October 2018, Padua, Italy.

3. Di Meo C., Montanari E., **Zoratto N.**, Coviello T., Matricardi P., ‘*Polysaccharide-based nanohydrogels as drug carriers*’, EUPOC 2018 – Biomimetic Polymers by rational design, imprinting and conjugation, May 2018, Como, Italy.

4. **Zoratto N.**, Palmieri F. R., Montanari E., Cencetti C., Di Meo C., Manca M. L., Manconi M., Matricardi P., ‘*Design of hybrid gels based on Gellan and P90G liposomes for drug depot applications*’, PBP World Meeting, March 2018, Granada, Spain.

5. Zoratto N., Manzi G., Sabia R., Villani C., Coviello T., Matricardi P., Di Meo C., *'Hyaluronic acid-click-riboflavin nanohydrogels as drug delivery carriers'*, Scuola avanzata in nanomedicina, September 2017, Pula, Italy.

6. Zoratto N., Klein Cerrejon, Zhi L., Leroux J.C. *'Bioinspired, low-cost device for minimally invasive blood sampling'*. Swiss Pharma Science Day, September 2023, Bern, Switzerland.