

BIOGRAPHICAL SKETCH

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NAME: Paolo Bergese

eRA COMMONS USER NAME (credential, e.g., agency login): n. a.

POSITION TITLE: Full Professor of Chemistry

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
University of Torino, Italy	MSc	1999	Physics
University of Brescia, Italy	PhD	2003	Materials Engineering
National Institute for Nuclear Physics (INFN), Italy	postdoc	2004	Structure of nanomaterials
University of Brescia, Italy	postdoc	2005	Pharmaceutical nanomaterials

A. Personal Statement

I grew up as a scientist at the bio-nano frontier, where I discovered that colloid and surface chemistry can both raise and answer biological questions. Today, I lead a multidisciplinary team pioneering the integration of chemistry, nanotechnology, and molecular biology in extracellular nanoparticle research, developing new analytical techniques and uncovering fundamental insights into their structure and function.

Over the past decade, I have coordinated national and international projects totaling more than €8M and participated in additional projects totaling more than €6M, securing over €4M of extramural funding for my institutions. I am also deeply committed to training the next generation of scientists, having mentored more than 60 BSc, MSc, PhD, and postdoctoral researchers.

My expertise in the structural characterization of synthetic, hybrid, and natural vesicles ensures that I will maximize the value of the requested facility time, generating data of broad relevance to the field and directly advancing the goals of this project.

B. Positions, Scientific Appointments, and Honors

- **Full Professor of Chemistry, University of Brescia** – Head, bioCSI Lab (*Biogenic Colloid Surfaces and Interfaces*), Department of Molecular and Translational Medicine (*present*)
- **Associate Researcher, Institute for Research and Biomedical Innovation, CNR** (*present*)
- **Member, Italian Center for Colloid and Interface Science (CSGI)** (*present*)
- **Visiting Professor, Massachusetts Institute of Technology (MIT)** (2010–2012) – Collaborative research in biological surface nanoscience
- **Co-Founder, Lab Network for Extracellular Nanoparticle Characterization**, within the Center for Colloids and Surface Science (CSGI), collaborating with Debora Berti (University of Florence), Francesco Valle (CNR, Bologna), Marina Cretich (CNR, Milan), and Pietro Parisse (CNR, Trieste) (*present*)

Honors

- European Materials Research Society (E-MRS) Young Scientist Award (2002) for pioneering work in micro- and nanocomposites

C. Contributions to Science

My scientific contributions in biological surface and nanoscience, with a recent focus on the physical chemistry of extracellular nanoparticles, are internationally recognized, with 110+ peer-reviewed publications and over 13,000 citations (Scopus).

Contributions relevant to this call:

1. Defining the Physical Chemistry of Extracellular Nanoparticles and Its Relation to Their Function

My group has pioneered concepts and studies that revealed how colloid and surface chemistry principles govern the formation, stability, and function of extracellular vesicles and other biogenic nanoparticles. These findings established a physicochemical framework for understanding their biological roles and illuminated the nanoscale dimension of the secretome.

Selected publications:

- L. Paolini, A. Zendrini, G. Di Noto, S. Busatto, E. Lottini, A. Radeghieri, A. Dossi, A. Caneschi, D. Ricotta and P. Bergese: Residual matrix from different separation techniques impacts exosome biological activity. *Scientific Reports*, 6 (2016) doi:10.1038/srep23550.
- S. Busatto, A. Zendrini, A. Radeghieri, L. Paolini, M. Romano, M. Presta and P. Bergese: The nanostructured secretome. *Biomaterials Science*, 8(1), 39-63 (2020) doi:10.1039/c9bm01007f.
- A. Musicò, R. Zenatelli, M. Romano, A. Zendrini, S. Alacqua, S. Tassoni, L. Paolini, C. Urbinati, M. Rusnati, P. Bergese, G. Pomarico and A. Radeghieri: Surface functionalization of extracellular vesicle nanoparticles with antibodies: a first study on the protein corona "variable". *Nanoscale Adv*, 5(18), 4703-4717 (2023) doi:10.1039/d3na00280b.
- A. Musicò, A. Zendrini, S. G. Reyes, V. Mangolini, L. Paolini, M. Romano, A. Papait, A. R. Silini, P. Di Gianvincenzo, A. Neva, M. Cretich, O. Parolini, C. Almici, S. E. Moya, A. Radeghieri and P. Bergese: Extracellular vesicles of different cellular origin feature distinct biomolecular corona dynamics. *Nanoscale Horiz*, 10(1), 104-112 (2024) doi:10.1039/d4nh00320a.
- Manno, M., Bongiovanni, A., Margolis, L. et al. The physico-chemical landscape of extracellular vesicles. *Nat Rev Bioeng* (2024). doi:10.1038/s44222-024-00255-5.

2. Advancing Analytical Tools for Characterization of Synthetic and Extracellular Vesicles

We developed and optimized cutting-edge analytical methods for the structural and surface analysis of synthetic and natural vesicles, as well as their interactions with solid-state nanoparticles. These approaches enable more reproducible, quantitative, and high-resolution research across the field.

Selected publications:

- D. Maiolo, L. Paolini, G. Di Noto, A. Zendrini, D. Berti, P. Bergese and D. Ricotta: Colorimetric Nanoplasmonic Assay To Determine Purity and Titrate Extracellular Vesicles. *Analytical Chemistry*, 87(8), 4168-4176 (2015) doi:10.1021/ac504861d.
- A. Ridolfi, M. Brucale, C. Montis, L. Caselli, L. Paolini, A. Borup, A. Boysen, F. Loria, M. van Herwijnen, M. Kleinjan, P. Nejsun, N. Zarovni, M. Wauben, D. Berti, P. Bergese and F. Valle: AFM-Based High-Throughput Nanomechanical Screening of Single Extracellular Vesicles. *Analytical Chemistry*, 92(15), 10274-10282 (2020) doi:10.1021/acs.analchem.9b05716.
- L. Paolini, S. Federici, G. Consoli, D. Arceri, A. Radeghieri, I. Alessandri and P. Bergese: Fourier-transform Infrared (FT-IR) spectroscopy fingerprints subpopulations of extracellular vesicles of different sizes and cellular origin. *Journal of Extracellular Vesicles*, 9(1) (2020) doi:10.1080/20013078.2020.1741174.
- L. Caselli, A. Ridolfi, J. Cardellini, L. Sharpnack, L. Paolini, M. Brucale, F. Valle, C. Montis, P. Bergese and D. Berti: A plasmon-based nanoruler to probe the mechanical properties of synthetic and biogenic nanosized lipid vesicles. *Nanoscale Horizons*, 6(7), 543-550 (2021) doi:10.1039/d1nh00012h.

3. Leading Multidisciplinary and Translational Research Initiatives

As coordinator of Horizon 2020 FET projects and partner PI in other initiatives, I established large-scale European collaborations that translated fundamental insights into innovative platforms for therapeutics and diagnostics based on extracellular vesicles. Noteworthy among these are the Horizon 2020 FET projects I coordinated: evFOUNDRY – The Extracellular Vesicle Foundry (<http://www.evfoundry.eu/>) and BOW – Biogenic Organotropic Wetsuits (<https://www.bowproject.eu/>), as well as the project funded by the Italian Ministry of Health: “Muscle Tissue Extracellular Vesicles: Novel Biomarkers for Sepsis-Related Intensive Care Unit Acquired Weakness (ICU-AW).”

Full updated CV can be found at <http://orcid.org/0000-0002-4652-2168>.

Brescia, 24/09/2025

