

CF-S



Prof. Pompea DEL VECCHIO - PA

Room 1N-18; phone +39-081-6-74255

E-mail pompeagiuseppinagrazia.delvecchio@unina.it;

Website <https://www.docenti.unina.it/pompeagiuseppinagrazia.delvecchio>;

ORCID <https://orcid.org/0000-0002-9760-3478>

Publication <https://www.iris.unina.it/cris/rp/rp28513?sortBy=2&order=DESC&type=all>



Prof. Gerardino D'ERRICO - PO

Room 1P-03; phone +39-081-6-74248

E-mail gerardino.derrico@unina.it;

website <https://www.docenti.unina.it/gerardino.derrico>;

ORCID <https://orcid.org/0000-0001-6383-8618>

Publications <https://www.iris.unina.it/cris/rp/rp01290?sortBy=2&order=DESC&type=all>



Dr. Giarita FERRARO - RTDB

Room 1N-09; phone +39-081-6-74269

E-mail giarita.ferraro@unina.it;

website <https://www.docenti.unina.it/giarita.ferraro>;

ORCID <https://orcid.org/0000-0001-9385-2429>;

Publications <https://www.iris.unina.it/cris/rp/rp30655?sortBy=2&order=DESC&type=all>



Dr. Noemi Gallucci - RTDA

Room 1P-04; phone +39-081-6-74247

E-mail noemi.gallucci@unina.it;

Website <https://www.docenti.unina.it/noemi.gallucci>;

ORCID <https://orcid.org/0000-0002-6855-5112>

Publications <https://www.iris.unina.it/cris/rp/rp76590?sortBy=2&order=DESC&type=all>



Prof. Antonello MERLINO- PO

Room 1N-10; phone +39-081-6-74276

E-mail antonello.merlino@unina.it;

Website <https://www.docenti.unina.it/antonello.merlino>;

ORCID <https://orcid.org/0000-0002-1045-7720>

Publications <https://www.iris.unina.it/cris/rp/rp04191?sortBy=2&order=DESC&type=all>



Dr. Rosario OLIVA - RTDA

Room 1N-19; phone +39-081-6-74254

E-mail rosario.oliva2@unina.it;

website <https://www.docenti.unina.it/rosario.oliva2>;

ORCID <https://orcid.org/0000-0003-1763-1768>

Publications <https://www.iris.unina.it/cris/rp/rp28243?sortBy=2&order=DESC&type=all>



Prof. Luigi PADUANO - PO

Room 1P-06; phone +39-081-6-74191

E-mail luigi.paduano@unina.it

Website <https://www.docenti.unina.it/luigi.paduano>

ORCID <https://orcid.org/0000-0002-1105-4237>

Publications <https://www.iris.unina.it/cris/rp/rp25361?sortBy=2&order=DESC&type=all>



Prof. Luigi PETRACCONE - PA

Room 1N-21; phone +39-081-6-74263

E-mail luigi.petraccone@unina.it;

website <https://www.docenti.unina.it/luigi.petraccone>;

ORCID <https://orcid.org/0000-0003-3313-2897>

Publications <https://www.iris.unina.it/cris/rp/rp04244?sortBy=2&order=DESC&type=all>



Dr. Silvia PIZZIMENTI - RTDA

Room 1N-04; phone +39-081-6-74281

E-mail silvia.pizzimenti@unina.it;

website <https://www.docenti.unina.it/silvia.pizzimenti>;

ORCID <https://orcid.org/0000-0002-6230-5681>;



Prof. Irene RUSSO KRAUSS - PA

Room 1N-13; phone +39-081-6-74227

E-mail irene.russokrauss@unina.it;

website <https://www.docenti.unina.it/irene.russokrauss>;

ORCID <https://orcid.org/0000-0001-8124-6034>

Publications <https://www.iris.unina.it/cris/rp/rp13113?sortBy=2&order=DESC&type=all>



Prof. Filomena SICA - PA

Room 1N-02; phone +39-081-6-74479

E-mail filomena.sica@unina.it

Website <https://www.docenti.unina.it/filomena.sica>;

ORCID <https://orcid.org/0000-0003-4501-4476>;

Publications <https://www.iris.unina.it/cris/rp/rp28506?sortBy=2&order=DESC&type=all>



Dr. Romualdo TROISI - RTDA

Room 1N-04; phone +39-081-6-74281

E-mail romualdo.troisi@unina.it;

website <https://www.docenti.unina.it/romualdo.troisi>;

ORCID <https://orcid.org/0000-0002-3484-3589>;

Publication <https://www.iris.unina.it/cris/rp/rp49292?sortBy=2&order=DESC&type=all>;

Social web <https://x.com/TroRom>

Prof. Alessandro VERGARA - PO

Room 1N-05; phone +39-081-6-74259

E-mail alessandro.vergara@unina.it;

website <https://www.docenti.unina.it/alessandro.vergara>;

ORCID <https://orcid.org/0000-0003-4135-0245>

Publications <https://www.iris.unina.it/cris/rp/rp23722?sortBy=2&order=DESC&type=all>

LIST OF GROUP MEMBERS:

Dr. Virginia Cuomo (post-doc)

Dr. Marco Campanile (post-doc)

Dr. Miriam Alberico (PhD student Heritage Science)

Dr. Martina D'Auria (PhD student)

Dr. Alessandro Cangiano (PhD student)

Dr. Carlo Carandente Coscia (PhD student)

Dr. Ilaria De Cristofaro (PhD student)

Dr. Ilaria Di Donato (PhD student)

Dr. Maddalena Paolillo (PhD student)

Dr. Claudio Savino (PhD student)

Dr. Matilde Tancredi (Chemical Sciences)

Dr. Gabriella Tito (PhD student Computational and Quantitative Biology)

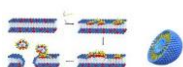
Dr. Attila Tortorella (PhD student Molecular Sciences for Earth and Space)

CF-S: CHIMICA FISICA - SPERIMENTALE (Research)

- 1) Characterization of biological model membranes and their interactions with peptides and proteins**
- 2) Physico-chemical characterization of biocondensates formed by proteins of pharmacological interest and their targeting with bioactive peptides**
- 3) Structural and thermodynamic characterization of biological macromolecules in solution**
- 4) Development of biocompatible delivery systems for drug delivery**
- 5) Structural characterization of biological macromolecules and their complexes with ligands and metallodrugs**
- 6) Synthesis and Characterization of nano-systems: nanoparticles and nanostructured materials.**
- 7) Design and characterization of nano-vehicles and their interaction with membranes and proteins**
- 8) Formulation and characterization of colloidal systems**
- 9) Chemistry for cultural heritage**

1) Characterization of biological model membranes and their interactions with peptides and proteins

Biological model membranes are produced (for example with the thin layer method) and characterized by means of spectroscopic techniques, including fluorescence spectroscopy and electron paramagnetic spectroscopy (with the spin label approach), as well as calorimetric and neutron scattering ones (neutron reflectivity), in terms of structural, dynamic, and functional properties. Their interaction with peptides and proteins is also investigated from a thermodynamic point of view through the same combination of spectroscopic and calorimetric methods, with the final intent to disentangle the intricate action mechanism of these bioactive molecules.



2) Physico-chemical characterization of biocondensates formed by proteins of pharmacological interest and their targeting with bioactive peptides

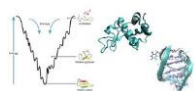
Liquid-liquid phase separation (LLPS) of proteins and nucleic acids lead to the formation of biocondensates, liquid-like structures used by the cell to control, in space and time, key biochemical reactions. Recently, it has been shown that biocondensates are involved in the initiation and spread of several diseases, like neurodegenerative ones, viral infection and cancer. The aim of this research activity is to modulate the formation of biocondensates, their structure and dynamics with small bioactive peptides, in order to hamper their function and the spread of the related disease. The characterization is carried out by using a multitechnique approach, including microscopy (light and fluorescence), spectroscopy

(UV/Vis, fluorescence, anisotropy, circular dichroism), light scattering (DLS), electronic paramagnetic resonance (EPR) and calorimetry (DSC and ITC).



3) Structural and thermodynamic characterization of biological macromolecules in solution

Characterization of biological macromolecules, proteins and nucleic acids, by analysis of the structure and conformational stability via spectroscopic (circular dichroism, UV-visible and fluorescence), electrophoretic and calorimetric (DSC-differential scanning calorimetry, ITC-isothermal titration calorimetry) techniques. Thermodynamic characterization of biological macromolecules in aqueous solution and in the presence of denaturing and stabilizing co-solutes. Development of thermodynamic models for interpretation of experimental data.



List of collaborations

- Prof. Roland Winter, TU Dortmund University, Dortmund, Germany
- Prof. Jorg Tatzelt, Ruhr Bochum University, Bochum, Germany
- Prof. Elsa Sánchez García, TU Dortmund University, Dortmund, Germany
- Dr. Satyajit Patra, Birla Institute of Technology & Science, Pilani, Rajasthan, India
- Dr. Rita Berisio, IBB Institute of Biostructures and Bioimages, CNR, Naples, Italy
- Dr. Daniela Corda, IOEMI Institute of Endotypes in Oncology, Metabolism and Immunology "G. Salvatore", CNR, Naples, Italy
- Prof. Giuseppe Graziano, University of Sannio, Benevento, Italy
- Prof. Antimo Di Maro, University of Campania "Vanvitelli", Caserta, Italy
- Prof. Concetta Giancola, Department of Pharmacy, University of Naples Federico II, Naples, Italy

List of active research projects:

- Antimicrobial Peptides for Skin Healthcare: Mechanism of Action and Encapsulation in Nanocarriers, FRA2022, Linea C, Oliva Rosario
- NATural COMpounds Screening for the selective targeting of G-quadruplex (G4) structures contained in therapeutic aptamers, and cancer-/viral-related genome regulatory regions, FRA2022, Linea B, Luigi Petraccone

4) Development of biocompatible delivery systems for drug delivery

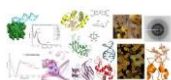
Production of biocompatible nanocarriers based on proteins (ferritin, transferrin, albumins) and polymers (PLGA: poly(lactic-co-glycolic acid)) for the safe delivery of known and new bioactive molecules with pharmacological properties (anticancer, antimicrobial antidiabetic).

Structural and functional characterization (drug loading capacity, stability, drug release) by means of spectroscopic techniques and X-ray crystallography.



5) **Structural characterization of biological macromolecules and their complexes with ligands and metallodrugs**

Structural characterization by means of X-ray crystallography of biological macromolecules (nucleic acids and proteins) free and in complex with ligands and drugs (metal-complexes, small molecules, other biomacromolecules, etc.). Support of Raman micro-spectroscopy and spectroscopic/scattering techniques and to investigate binding, stability of the complexes and induced structural changes. A molecular dynamics simulation approach is also used to analyze the conformational flexibility of these systems.



Main collaborations:

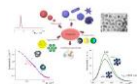
- Prof. Luigi Messori, Dr. Lara Massai, Department of Chemistry “Ugo Schiff” - University of Florence, Florence, Italy
- Prof. Tiziano Marzo, Prof. Alessandro Pratesi, Department of Pharmacy - University of Pisa, Pisa Italy
- Prof. Eugenio Garribba, Department of Medicine, Surgery and Pharmacy, University of Sassari, Sassari, Italy
- Prof. Santiago Herrero, Department of Inorganic Chemistry, Faculty of Chemical Sciences, Complutense University of Madrid, Spain
- Prof. Rupam Dinda, Department of Chemistry, National Institute of Technology, Rourkela, Odisha, India
- Prof. Pavel Starha, Department of Inorganic Chemistry, Faculty of Science, Palacký University Olomouc, Republic

List of active research projects:

- MNESYS: “A multiscale integrated approach to the study of the nervous system in health and disease” – Spoke 3: “Micro- and nano-technology-based delivery systems for BBB crossing” (project code: PE00000006), Dr. Giarita Ferraro
- PRIN2022: “Biocompatible nanostructures for the chemotherapy treatment of prostate cancer” (project code: 2022ALJRPL), Dr. Giarita Ferraro
- PRIN2022: "Protein Metalation by Anticancer Metal-based Drugs" (project code: 2022JMFC3X), Prof. Antonello Merlino
- PRIN-PNRR: EnzyMime: " Biocompatible and sustainable enzyme mimics based on metal complexes with peptide derivatives: synthesis, characterization and potential biological applications"(project code: P2022EMY52), Prof. Antonello Merlino - Dr. Giarita Ferraro

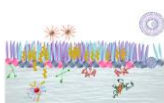
6) Synthesis and Characterization of nano-systems: nanoparticles and nanostructured materials

From single nanoparticles to superlattices through a bottom-up approach. Synthesis of bare and coating nanoparticles (metal, metal oxide, ceramic, carbon, hybrid) and their self-assembly using amphiphilic and polymeric molecules. Characterization of these systems utilizing spectroscopic techniques (UV-Vis, Fluorescence, IR, Raman, EPR), microscopy (TEM, Cryo-TEM, SEM, CLSM), scattering (light, neutron, X-ray), and reflectivity (neutron, X-ray).



7) Design and characterization of nano-vehicles and their interaction with membranes and proteins

Optimization of organic (lipid, polymer) and inorganic nano-vehicles for encapsulation and controlled release of drugs and active substances. The study of their interaction with membranes of different composition and complexity and different proteins when changing external parameters, such as temperature, pressure, pH, and ionic strength. The characterization of these systems by the following techniques: spectroscopic (UV-Vis, Fluorescence, Circular dichroism, EPR), scattering (light, neutron, X-ray), ellipsometry, QCMD, contact angle, reflectivity (neutron, X-ray), microscopy (CLSM, cryo-TEM).



8) Formulation and characterization of colloidal systems

Formulation, structural, and functional characterization of colloidal systems, based on surfactants polymers, both natural and synthetic, and proteins, in the presence of salts, cosolvents, fillers, and additives for industrial applications (pharmaceutical, cosmetic, energy, etc.). Characterization of these systems using spectroscopic techniques (IR, EPR), microscopy (CLSM, AFM), scattering (light, neutron, X-ray), reflectivity (neutron, X-ray), ellipsometry, QCMD, and contact angle.



List of active research projects:

- Bando a cascata PNRR Rome Technopole “nanoBIOsensori per la Rilevazione di Endotossine Batteriche: dalla ricerca alla formazione avanzata – BIOREB”
- Bando a cascata PNRR Tuscany Health “Nanosonde per la diagnosi da retina di malattie neurodegenerative – NanoEye”
- PRIN “*Biomimetic antimicrobial vesicle-like nanoarchitectures for multi-drugresistant bacteria* – BELIVE”
- Progetto LipAptaNanoSens 000008 ALTRI_Cda_75_2021_FRA_LINEA_B-VITIELLO

- Progetto PRIN2022 – PNRR “Green Protein-Based Nanohybrids as Adaptive Surfactants - GrASs”

9) **Chemistry for cultural heritage**

Archeometric research activity focuses on the development of physico-chemical protocols on works of art for addressing historical and technological questions, in collaborations with archaeologists and Museums.



List of collaborations

- Museums (Reggia di Caserta, Museo archeologico di Eboli, Area Metropolitana di Napoli)
- Archaeological parks (Pompei ed Ercolano)
- Department of Chemistry, Ghent University
- Department Asia, Africa and Mediterraneo, University of Naples “L’Orientale”
- Department of Humanistic Studies, DiSTAR, Department of Biology, Department of Physics, Department of Industrial Engineering, University of Naples Federico II
- CNR ISASI
- DICMAPI, University of Naples Federico II

List of active research projects:

- PNRR PE5 "CHANGES" 2022-2026, Prof. Alessandro Vergara
- PRIN 2022 "P2022YNMCL" 2022-2026, Prof. Alessandro Vergara
- Consolidator Grant "TabulaRasa" 2025-2030, Prof. Alessandro Vergara