

Brocca Paola

PERSONAL DATA

Name: Paola
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Nationality: Italian
Date of Birth: March 13, 1965
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CURRENT POSITION

Associate Professor, Applied Physics, Department of Biotechnology at the University of Milano, Italy

EDUCATION AND TRAINING

1996 Research fellow as part of Italian partnership to the European project titled: "Solubilization and Interfacial Properties of Surfactant Solutions" at Centre Resonance Magnetique Nucleaire a Haute Resolution" at CEA in Saclay (FR) (supervisor P. Berthault)

1994 Research fellow High resolution NMR laboratories C.E.A. Saclay – France (supervisor prof. B. Perly)

1992-1993 Fellow at the NMR laboratory of Department of Chemistry, Biochemistry and Medical Biotechnologies at the University of Milano, Italy (supervisor prof. S. Sonnino)

1991 Degree in Physics, University of Milano, Italy

PROFESSIONAL EXPERIENCE

2010-present: Associate professor in Applied Physics (SSD FIS07) at the University of Milano, Italy

2003-2010 Assistant professor in Applied Physics at the University of Milano, Italy

1996-2003 Technical and Scientific Responsible of the High Resolution NMR laboratory of the Department of Chemistry, Biochemistry and Medical Biotechnologies at the University of Milano, Italy

1996: Research contract founded by European Grant HCM (ERBCHRXCT920019) at High resolution NMR laboratories C.E.A. Saclay - France

1991: Degree in Physics, University of Milano, Italy

RESEARCH ACTIVITY

The research activity is directed to biophysics and nanotechnology in the field of biological soft matter.

- Soft colloidal systems studies involve membrane models and their interaction with proteins and polymers; self aggregating lipids and glycolipids; biological hydrogels and their interaction with nanomedicines of different nature. Research items have implication in neurological pathologies such as Alzheimer and phenylketonuria diseases.

- Structural studies of particles such as liposomes, polymer based or hybrid nanocarriers for the delivery of gene material and hydrophobic drugs are performed in collaboration with other Italian laboratories. Research items have implications in lung diseases treatment among which Cystic Fibrosis is the most relevant.

- Extracellular vesicle (EVs) has recently interested the research activity which is addressed to highlight their structural features and their behaviour in membrane fusion events.

- Research on fluid/fluid interfaces and surface active biomolecules at interface have recently been performed exploiting an interferometric techniques sensitive to very low surface concentrations.

Scattering and reflectometric techniques, by light, X-ray and neutron probes, together with High Resolution NMR, calorimetry, densitometry, Quartz Crystal Microbalance, Langmuir trough, are applied in the experimental work which is performed in the laboratories in Milano and at the European Large Scale Facilities for Synchrotron X-ray and neutron radiations applications.

TEACHING ACTIVITY

GRADUATE

2019- present Biomechanics, Graduate school in physical medicine and rehabilitation

2019- present Spectroscopy and imaging of biosystems on the nano-meso-macro scale. (PHD school in translational medicine)

UNDERGRADUATE

2013- present Medical Physics, School of Medicine

2003- present Applied Physics, School of Sport Science

2018-19 Mathematics, Technical Degree in Radiology

2013-15 Applied Physics, Degree in Orthopedics

2011-13 Applied Physics, Degree in Audiology

2001-03 Applied Physics, Degree in Speech Therapy

SCIENTIFIC OUTPUT (March 2022)

63 Original research articles; 2 book chapter; more than 100 contributions to congress (oral and posters), more than 20 oral communications (also invited)

The scientific impact of Prof. Brocca's publications at March 2022 can be summarized as follows (Fonti: Scopus; 2020 Journal Citation Reports™):

- h-index = 19
- Total citations 992

RESEARCH GRANTS (March 2022)

PI of more than 10 projects and co-PI of more than other 30, positively evaluated and financed by interdisciplinary boards to perform X-Ray and Neutron scattering, diffraction, reflectometry experiments and X-ray Photo Correlation Spectroscopy (XPCS), Microscopy at International Large Scale facilities in Europe (ILL, ESRF - Grenoble; LLB - Saclay; CEA Saclay; HZB - Berlin; MLZ-Garching; ELETTRA-Trieste; ISIS -Didcot), among which PI: SC 5138 (2020) 'Dynamics of airways mucus: healthy and pathologic'; SC 4728 (2017) 'Nanoparticles directional diffusion in mucus at the air-liquid interface of living cell culture'; SC 4472 (2016) 'Nanoparticles for drug and siRNA delivery in Cystic Fibrosis and their interaction with mucus model' and co-proposer : SC 4807 (2017)'Dynamics of airways mucus probed by X-ray Photon Correlation Spectroscopy (XPCS); SC 4078 (2014) 'Surface-modified nanocapsules for the nasal delivery of lipophilic drugs.'; SC 3379 (2011) Structural role of the lipid component in multicomponent lipoplexes containing complexed and condensed DNA and in their dynamic interaction with model membranes'.

2021 'Fluid/fluid interface instability at adsorption of surface active biomolecules'. PSR2021 by University of Milano PI 1.6 k€

2020 'Fluid/fluid interface and surface active biomolecules'. PSSR2020 by University of Milano PI 1.7 k€

2019 'Sodium Hyaluronate Nanoparticles for Treatment of Mycobacterial Pulmonary Infections by inhalation'. PSR2019 by University of Milano (Co-PI) 20 k€.

2018-2019 Nanotechnology-based strategies to overcome the mucus barrier in chronic obstructive lung disease. PSR2018 by University of Milano (Co-PI) 6.9 k€

2017 'Nanomedicine development in Cystic Fibrosis lung disease: in vitro model for siRNA delivery through the airway barrier' PSR2017 by University of Milano (PI) 20 k€.

2016- 2021 'noMAGIC-noninvasive manipulation of gating in ion channels', grant n. 695078 H2020-ERC-2015- AdG 2'409'209€ to Anna Moroni, University of Milano, (collaborator).

2015-2017 - *Inhalable formulations of new molecules effective against Burkholderia cenocepacia: from in vitro to in vivo applications* (FFC#19/2015) - multicentre national project funded by Italian Cystic Fibrosis Research Foundation to Prof. G. Riccardi (PI, University of Pavia) aimed to develop and validate *in vivo* inhalable formulations of new antimicrobials for use in CF therapy (external collaborator) 60 k€.

2014-2016 – The role of glucocerebrosidase GBA2 in Cystic Fibrosis lung inflammation: from molecular mechanism to therapeutic strategies (FFC #24/2014) grant by Italian Cystic Fibrosis Research Foundation to prof S. Sonnino (collaborator) 73 k€.

2009-2012 FIRB 2008 'Understanding the interaction between cells and lipid nanoparticles for gene delivery', by the Italian Minister for University, FIRB 2008 (collaborator) 163.4 k€

1996 European Grant HCM (ERBCHRXCT920019) "Solubilization and Interfacial Properties of Surfactant Solutions" (research fellow)

AWARDS AND HONOURS

2021 - Scientific Highlight of CERIC consortium for the work reported in: F. Perissinotto & V. Rondelli et al., *Nanoscale* 2021

2016 - Scientific Highlight of the ILL of Grenoble (FR) for the work reported in: V. Rondelli et al., *Scientific Reports* 2016

2012 - Scientific Highlight of the ILL of Grenoble (FR) for the work reported in: V. Rondelli et al., *BBA-Biomembranes* 2012

SUPERVISOR OF UNDERGRADUATE AND GRADUATE STUDENTS

Present 1 PhD Co-supervisor and 1 Master degree students.

Last 5 years - 3 Master's degree students working at their experimental thesis in Physics University of Milano.

ADVISORY ACTIVITY

Reviewer for International Scientific Journals: Biomacromolecules, Chemical Communications RCS, Colloids and Surface A, Colloids and Surface B, Colloids and Surface D, Physical Chemistry Chemical Physics, FEBS.

Reviewer for National and International Grant Societies:

2020 PRIN Grant program 2020 (MIUR, Italy)

PROFESSIONAL SOCIETIES

2019-present Italian Association for Physics (SIF)

2015-present Società Italiana di Biofisica Pura e Applicata (SIBPA)

2014-present Società Italiana di Spettroscopia Neutronica (SISN)

1996-2004 Istituto Nazionale per la Fisica della Materia (INFN), Sezione C (Liquidi e Sistemi Disordinati), Gruppo C1 (Fluidi Complessi), Unità di Pavia

1993 al 1997 Società Italiana di Biochimica

1990 al 1992 Istituto Nazionale di Fisica Nucleare (INFN)