TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Physics Department

- Astrophysics and cosmology
- Applied physics
- Condensed Matter
- Theoretical physics
- Fundamental interactions

2 theoretical groups and 5 experimental groups

Growth and characterization of advanced materials

Photonics and optical properties (excitons)

Organic molecules from molecular electronics to the study of the first peptides in early Eath

Theory of Condensed Matter Physics – Computational Methodologies

The Group

Website

Research lines

- Ground state properties (geometry, phonons…..)
- Excited state properties:
  - electronic band structures
  - optical properties
  - excitons
  - chiroptical spectroscopies
  - magnetic properties
- Plasmonics and Molecular Plasmonics

ab initio: DFT, PostDFT, PostHF
Multiscale QM/classical

The Projects

MARIE CURIE ACTIONS

E·C·E

PRIN 2022 IRIDE

PRIN2022 HEROS

ICSC Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing

MUR PRIN

ISCRA CINECA

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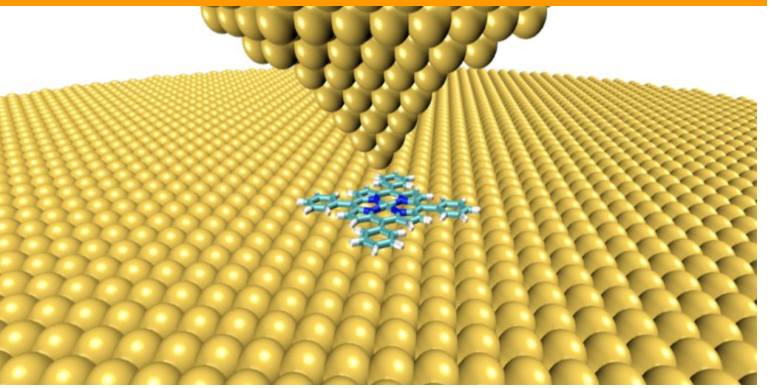
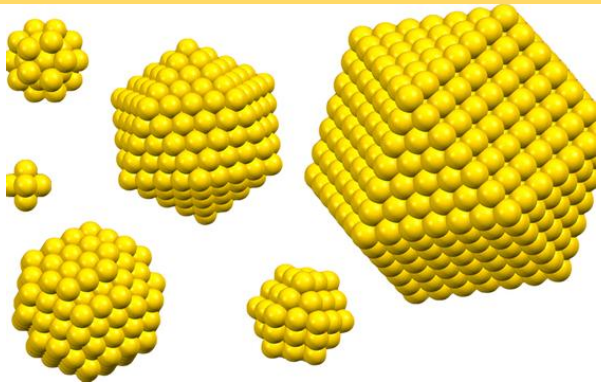
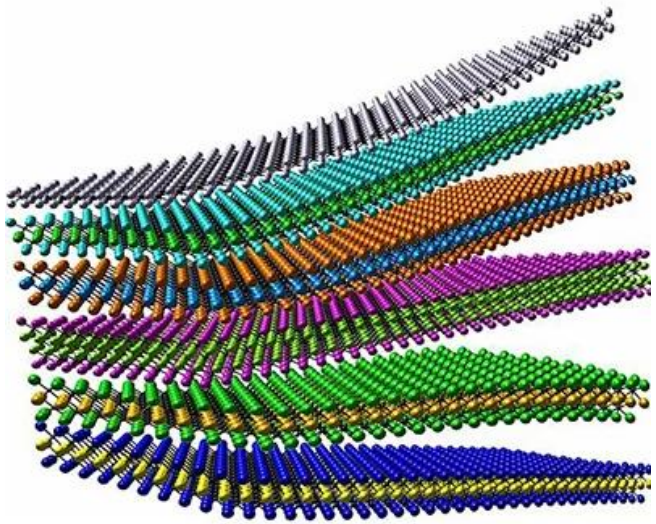
Light-Matter Interaction in Complex Systems



0D Materials:
Molecules, Clusters, Nanoparticles

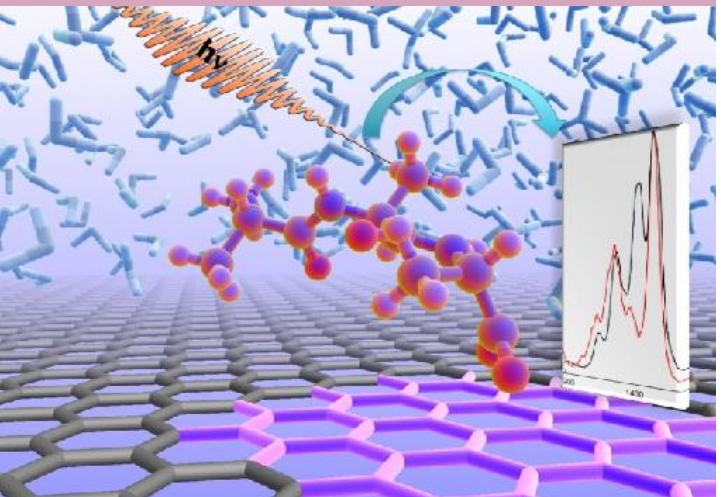


2D Materials:
Graphene, XEnes,TMD and beyond

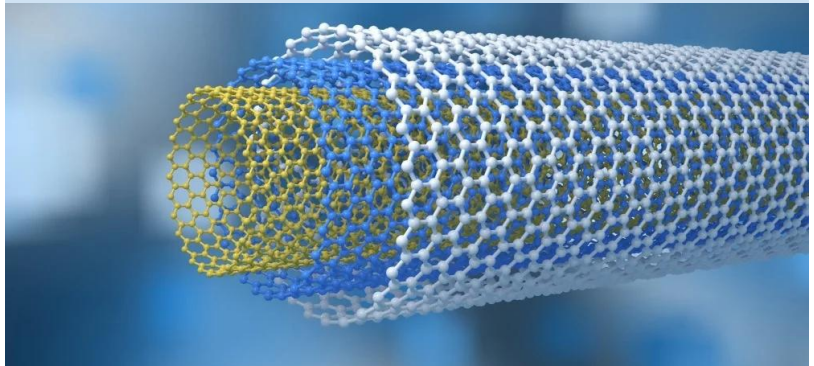


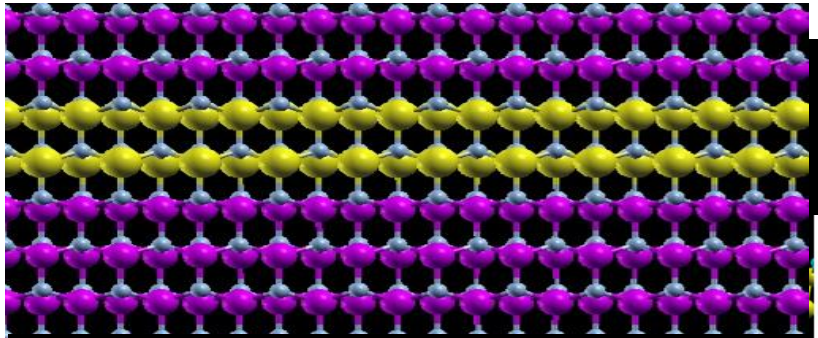
Computational Research of New Materials and Modeling of Complex Systems

Soft Matter
Water, Organic, and Biological Systems



1D Materials:
Wires, Tubes, …





3D Materials:
Crystals and Interfaces for Optoelectronic

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Nonequilibrium Theory and Simulations of Many-Body Quantum Systems

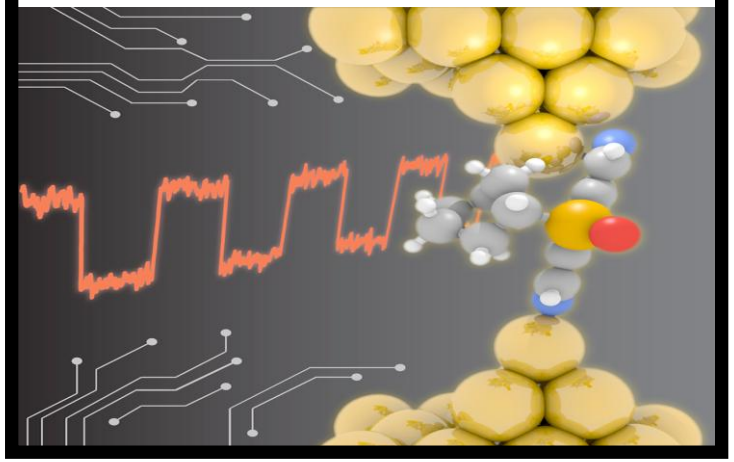
Group (from right): Enrico Perfetto, Gianluca Stefanucci, Alessandro Moreci (PhD).

Carlos Bentacur (PhD), Zhenlin Zhang (visiting Phd), Kai Wu (PostDoc student)

Collaborations

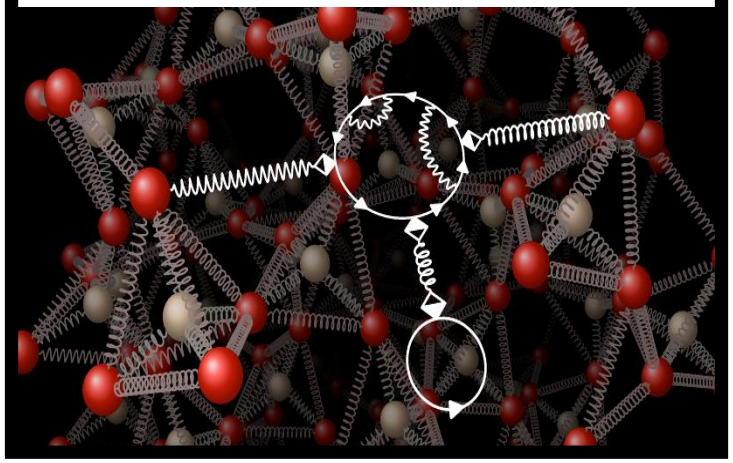
Nonequilibrium Theory and Simulations of Many-Body Quantum Systems

Molecular Electronics

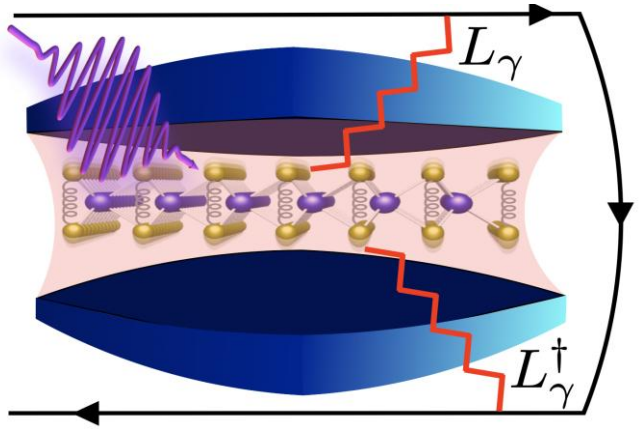


$$i\hbar\frac{d}{dt}\Psi = H\Psi$$

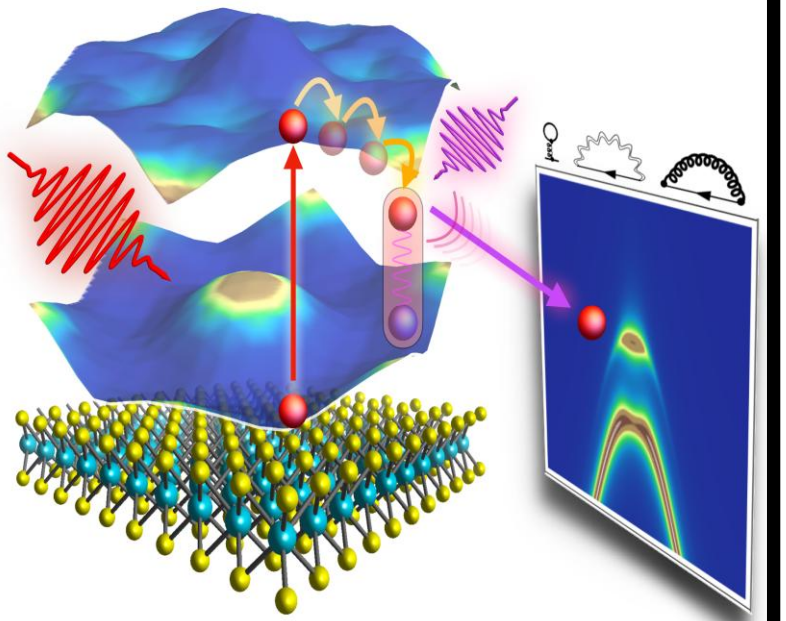
Nonequilibrium phonons



Dissipative Quantum Systems



Dynamics of Carriers and Excitons



Research on ultrafast quantum particles and their mutual interactions

Many-Body Theory Group

Contacts
Prof. Gianluca Stefanucci
Prof. Enrico Perfetto

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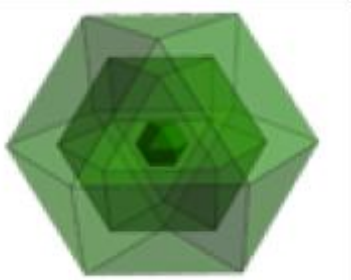
Nanomaterials for Photonics lab



Prof. Matteo Salvato

Prof. Paola Castrucci

Filippo Pierucci PhD Student

Riccardo Ciciotti Master Degree Student

Elettra Meini Bachelor Degree Student

Research Activity

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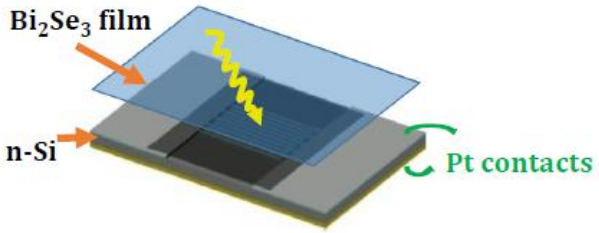
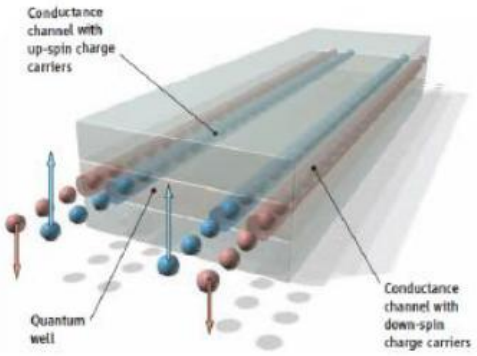
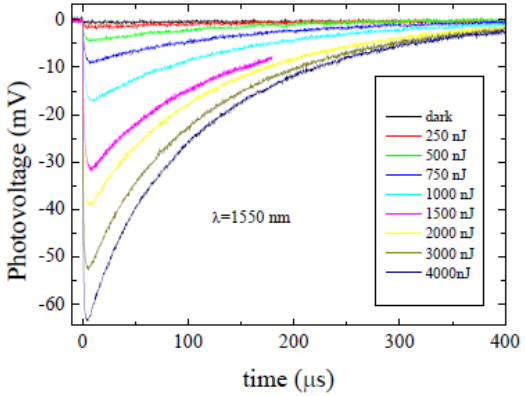
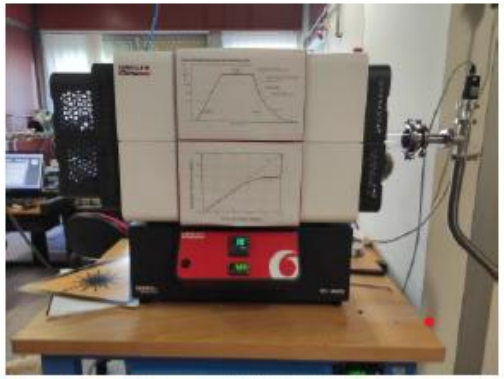
Physical and chemical vapour deposition growth and characterization of thin films and nanostructures of topological insulators

Investigation of heterojunctions based on topological insulators for Vis and IR photodetection









The Projects

- Regione Lazio, FOTONICS (2021-2023) – INFN, QUANTEP (2021-2023) - PRIN 2022 PNRR, SPIGA (2023-2025)
- University Project, ISTRICE (2022-2024), University Project – TESLA (2022-2024)

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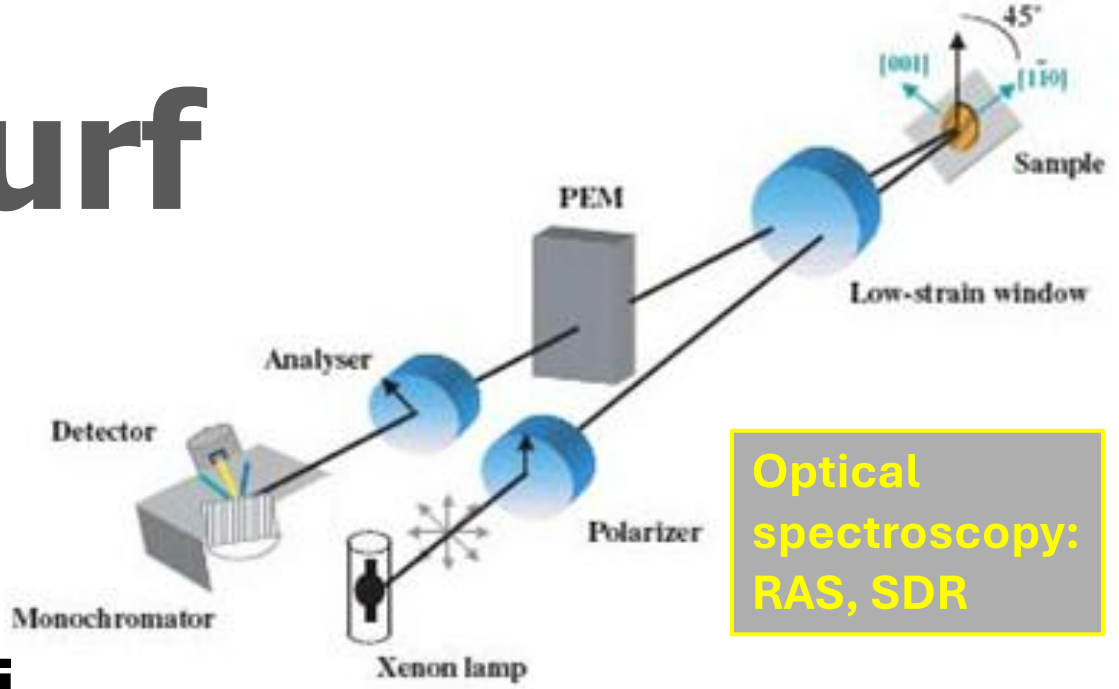
Nano@Surf

LT XPS Prebiotic Lab

Anna Sgarlata
Massimo Fanfoni
Beatrice Bonanni
Claudio Goletti
Ilaria Tomei
Valeria Battistelli
Raj Samnani



Optical spectroscopy: RAS, SDR

UHV STM

Research activities

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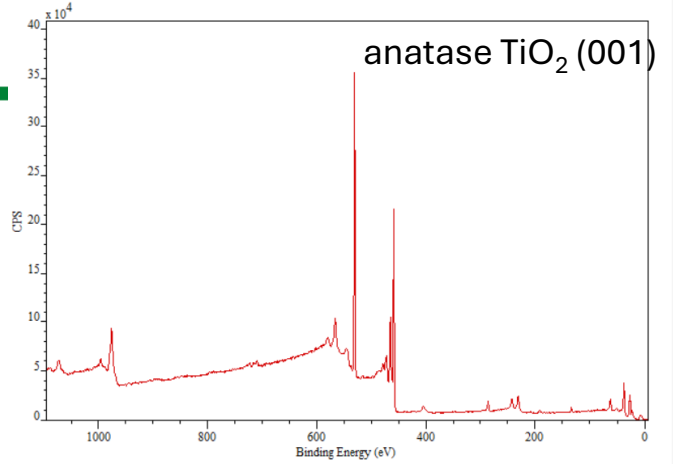
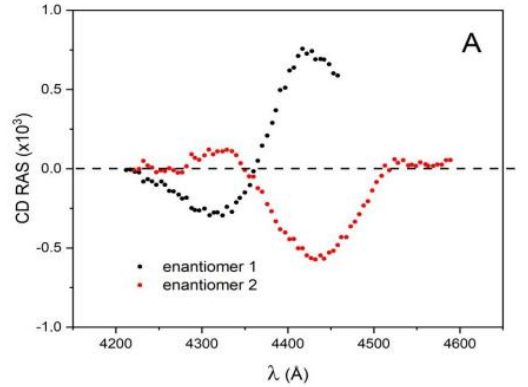
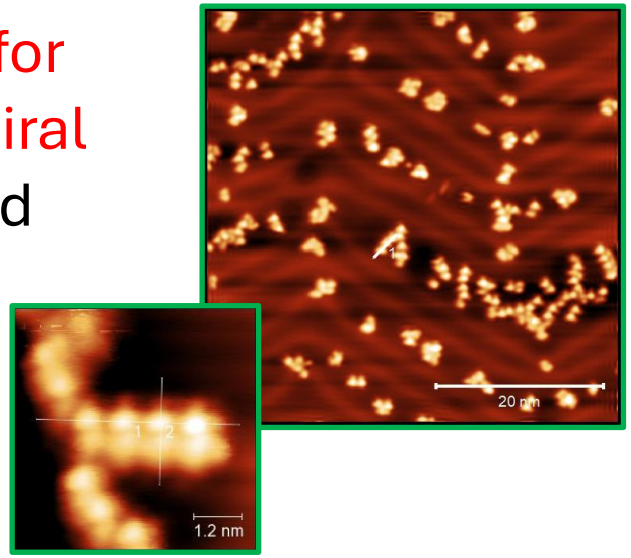
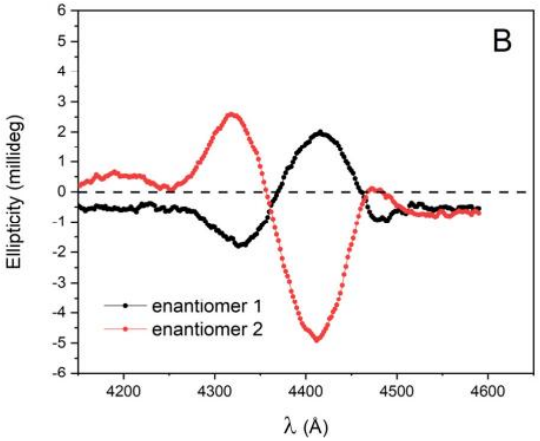
- XPS study of prebiotic conditions for the formation of peptide bonds in early Earth rocks or interstellar dust (**STILES project)**

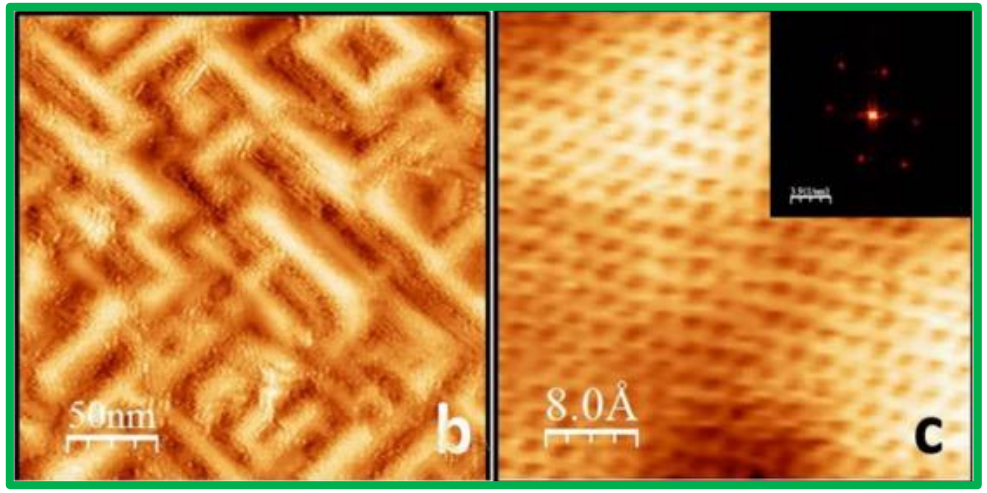




- Molecular films of porphyrins and/or corroles for sensoring applications. Study by STM and by chiral symmetry-sensitive optical techniques (RAS and SDR) **(GREEN project)**







- 2D materials: growth and morphological and spectroscopic characterization with atomic resolution of Graphene/Ge, Borophene, GeAs , $ZrSe_2$ (**HYBORON project)**

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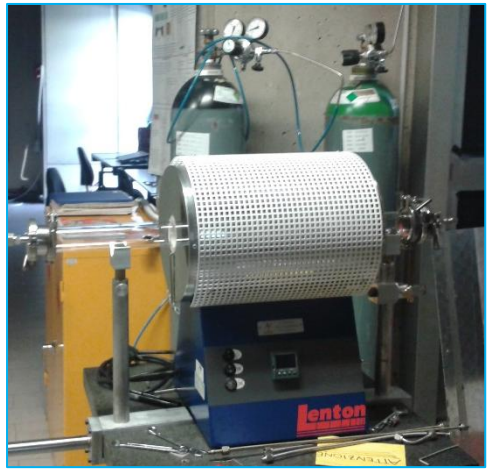
LowDLab

Prof. Manuela Scarselli

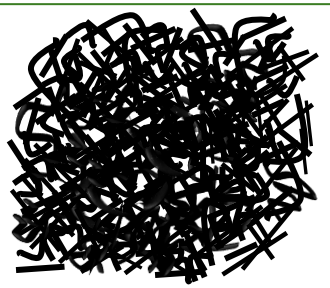
Dipartimento di Fisica

Ultra high vacuum system equipped with
- scanning tunneling microscope (STM)
- atomic force microscope (AFM)
- x-ray photoelectron spectroscopy
- low energy electron diffraction (LEED)
- triple e-beam evaporator
- e-gun



High vacuum system for thin film deposition on substrates
- 4 evaporators
- gas-line
- sample heater

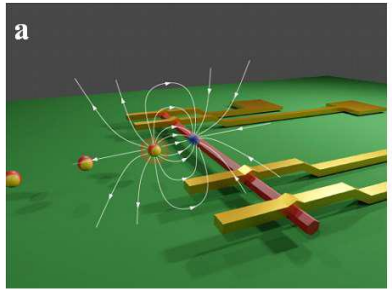
A system for the chemical vapor deposition growth of carbon nanostructures: carbon nanotubes (CNT) films or sponges, spheres

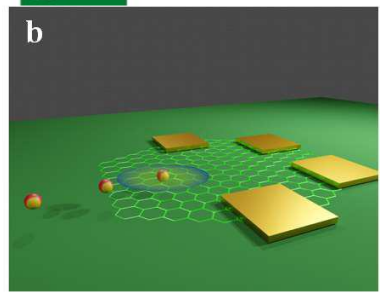


Research activities

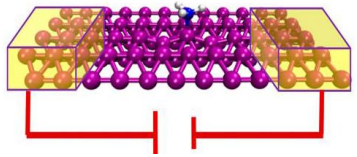
Funded projects:

Multidimensional n**AN**odevice arch**I**tectures **F**or l**O**w-perturbation sing**L**eion Detection (INFN-**MANIFOLD**)





Metal clusters decoration of Borophene nanostructures with enhanced Hydrogen adsorption and release properties (PRIN 2022 - **HYBORON**)



Collaborations:

- INTEL: Synthesis and applications of Transition Metal Dichalcogenides (& prof. L. Camilli)
- Prof. Arduini, Dip. Scienze e Tecnologie Chimiche Tor Vergata => CNT sponges for water purification from heavy metals
- Prof. Gunnella, Dip. Fisica, Università di Camerino => Metal cluster for Borophene nanostructures for hydrogen storage
- Prof. Rosolen, Uni. Sao Paulo, Brazil => Development of electrochemical sensor with carbon nanomaterials

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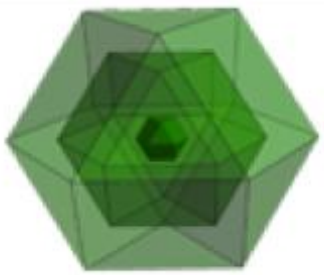
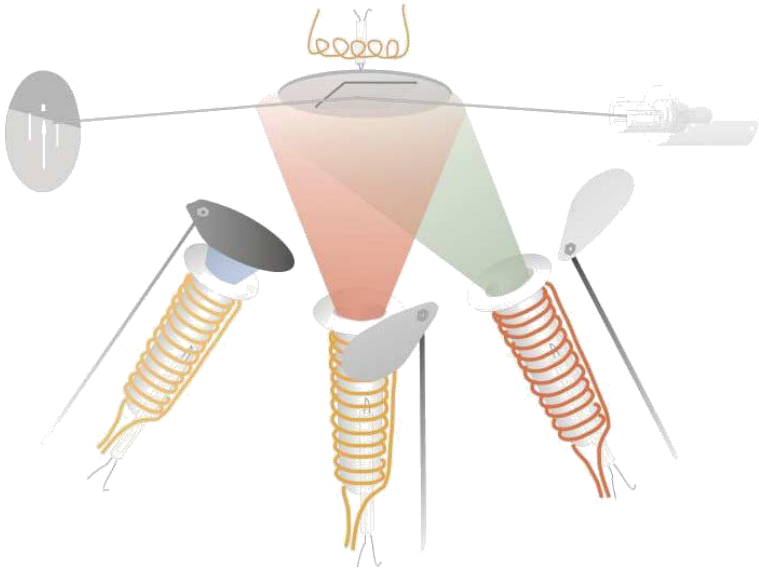
Molecular beam epitaxy and electron spectroscopy lab

Prof. Fabrizio Arciprete
Dr Sabrina Calvi
Dr. Simone Prili
Dr. Adriano Diaz Fattorini
Dr. Christian Petrucci





Research activities

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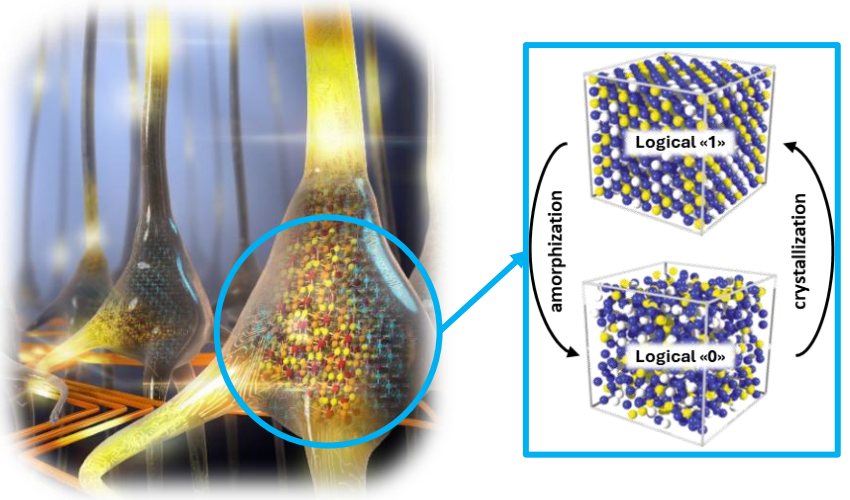
Main activities:
Phase-change materials and heterostructures for memory and artificial intelligence applications:

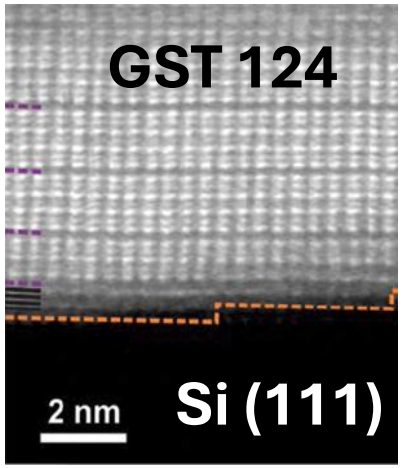
- ❑ Growth via molecular beam epitaxy(MBE)
  - Ge-Sb-Te based alloys
  - 2D Materials with transition metals (Ti, Mo, W)

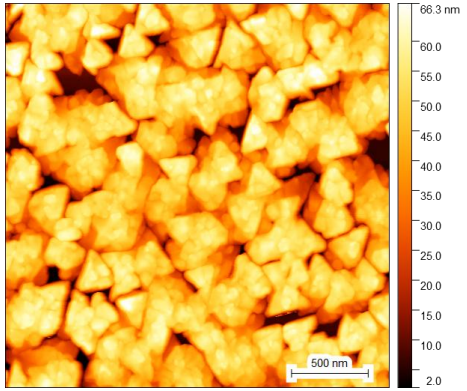
- ❑ Morphological, sctructural and electronic characterization
  - Atomic Force Microscopy (AFM)
  - Photoemission spectroscopies (XPS and UPS)
  - X-ray diffraction and Raman spectroscopy



Funded projects:
- Horizon 2020 «BeforeHand»
- PRIN2020 «EMPHASIS»

Collaborations:
- CNR-IMM ARTOV
- IBM
- ST Microelectronics
- Sapienza Università di Roma





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Low-Temperature Microscopy and Spectroscopy lab

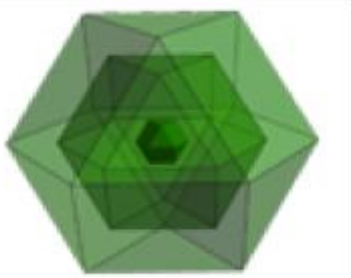
https://www.camillilab.com/

Prof. Luca Camilli

Prof. Luca Persichetti

PhD candidate: Antonio Caporale

PhD candidate: Gabriele Anselmi



Research activities

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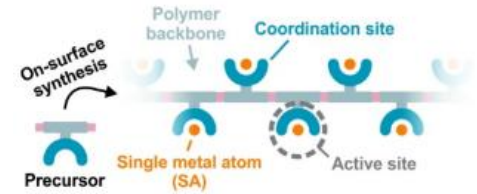
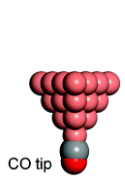
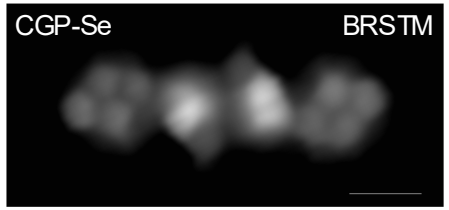
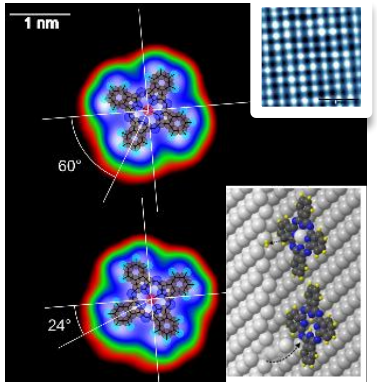
On-surface synthesis towards single metal atom platforms PRIN 2020 **Atypical**

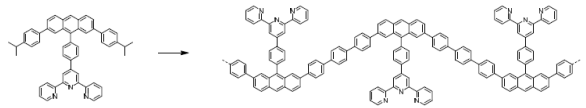


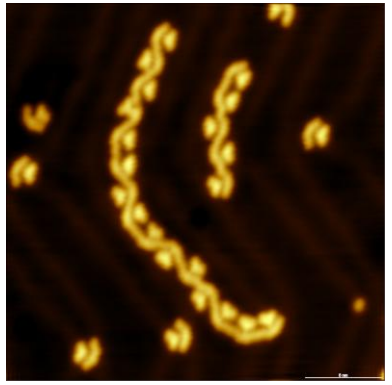
On-surface molecular recognition via non-covalent interaction

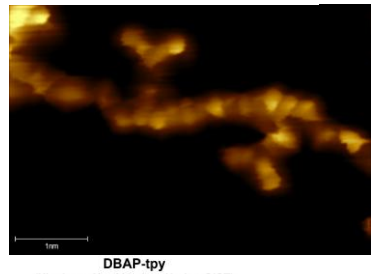


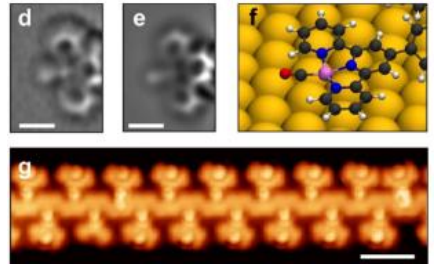


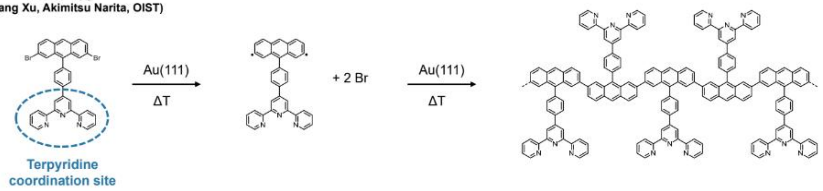


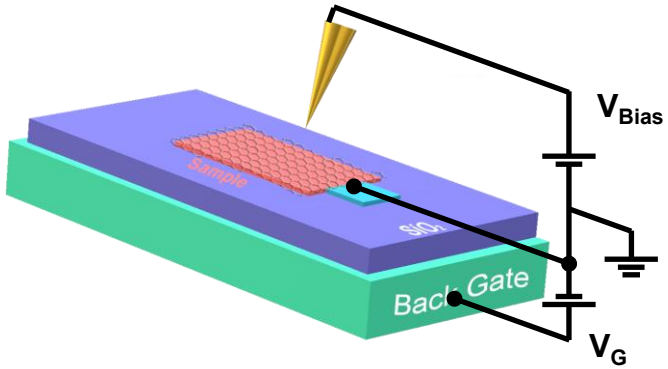


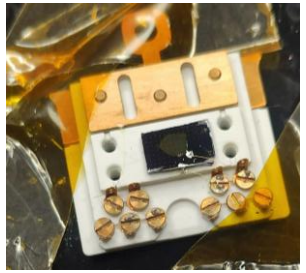


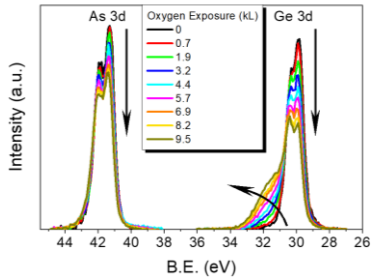






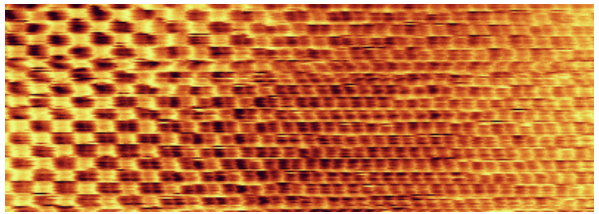






Chemical stability of 2D materials

STM on gate-tunable samples



Synthesis and characterization of topological insulators and 2D materials beyond graphene PRIN 2022 PNRR **Spiga** & University grant **SSITI**

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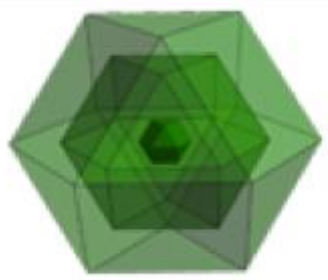
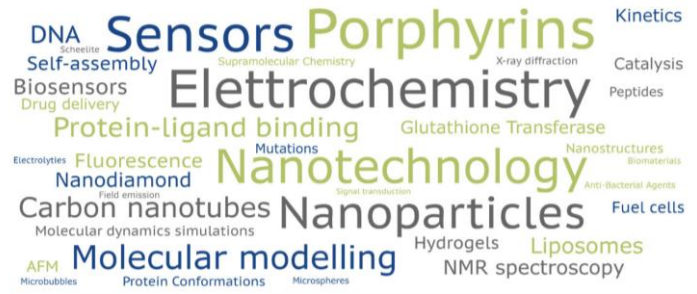
Bachelor's Degree in Materials Science and Master's Degree in Science and Technology of Materials
University of Rome Tor Vergata
"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025», June 12th 2025

Department of Chemical Science and Technologies



TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA
Dipartimento di Scienze e Tecnologie Chimiche
Dipartimenti di Eccellenza 2023-2027

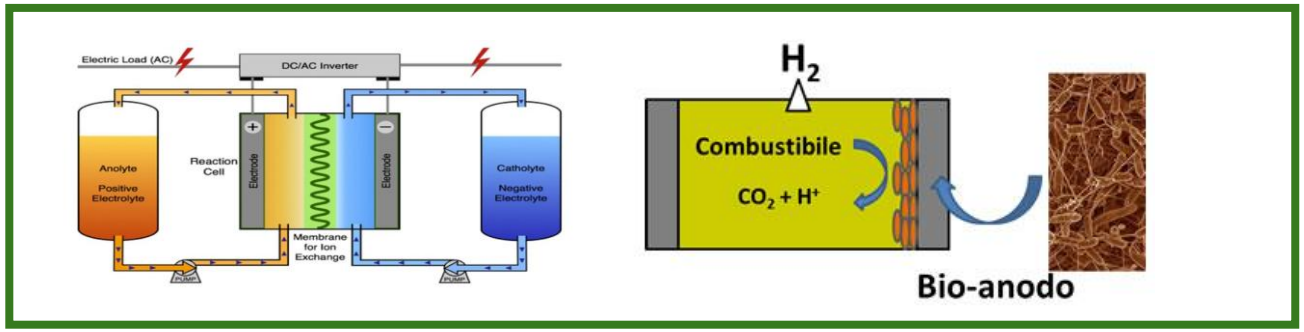


Research Activity

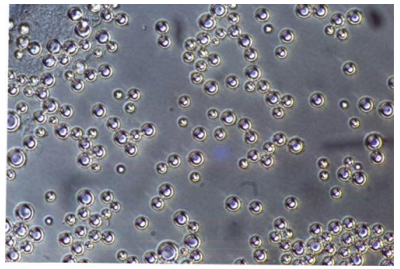
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

The Department of Chemical Science and Technologies has been selected as one of the 11 best Chemistry Departments in Italy.

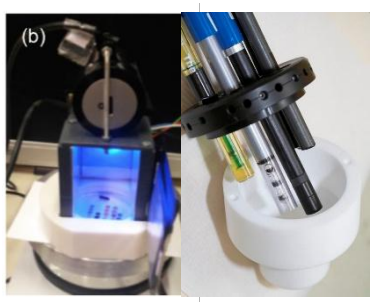
The X-Chem project involves the strengthening of three main lines of research:



Energy transition



Health

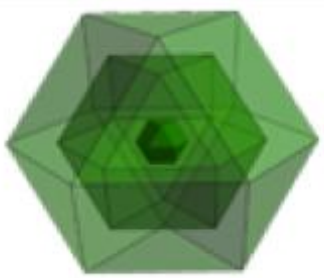


Environment

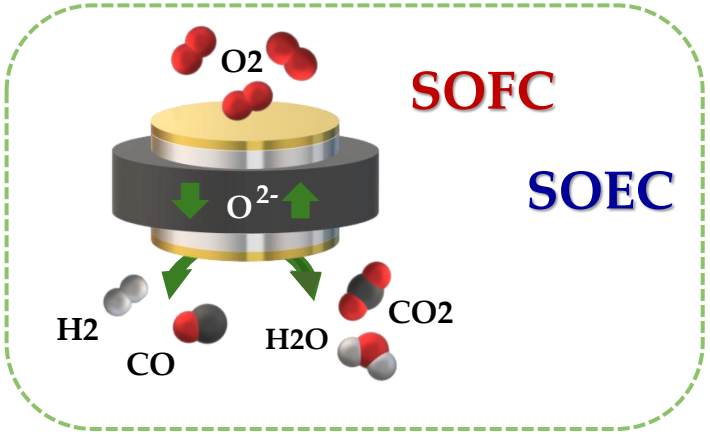
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Bachelor's Degree in Materials Science and Master's Degree in Science and Technology of Materials
University of Rome Tor Vergata
"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025», June 12th 2025

Solid Oxides Research Group (SORG)



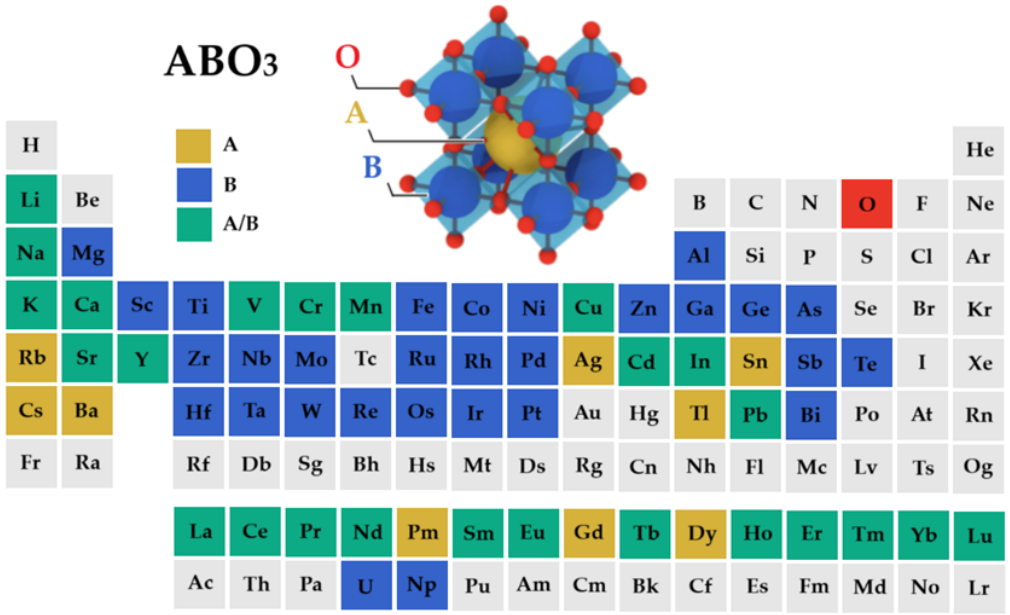
Prof. Elisabetta Di Bartolomeo
Dr. Leonardo Duranti

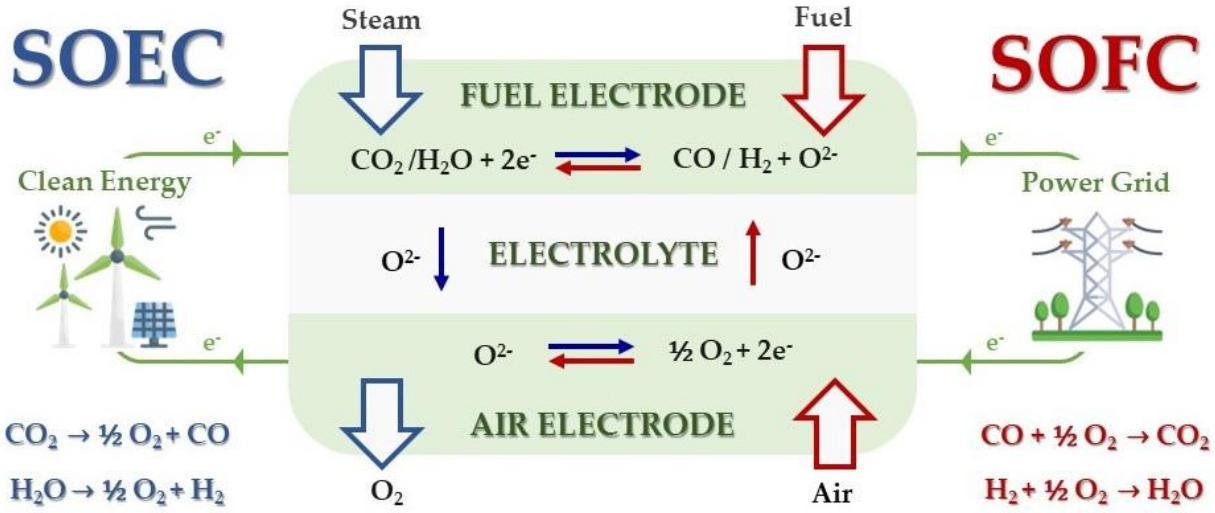


Research Activity

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Development of mixed oxides for electrochemical devices for energy conversion and storage. The experimental activity concerns the chemical synthesis of powders, the structural and microstructural characterization, the fabrication of electrochemical cells operating at high temperature (SOFC/SOEC) and the electrochemical tests.



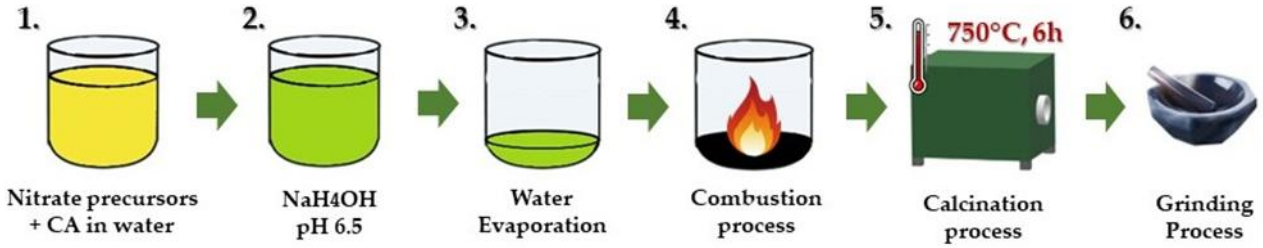


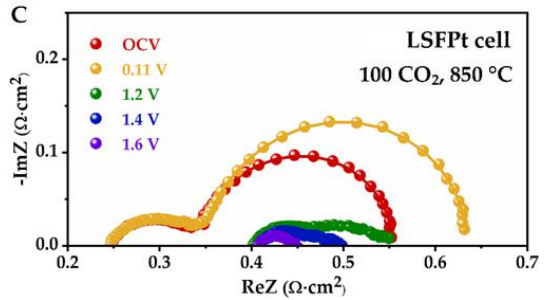
PRIN2022 (2022ZWYSKY): Advanced Materials for Reversible Solid Oxide Cells-AMARILLO

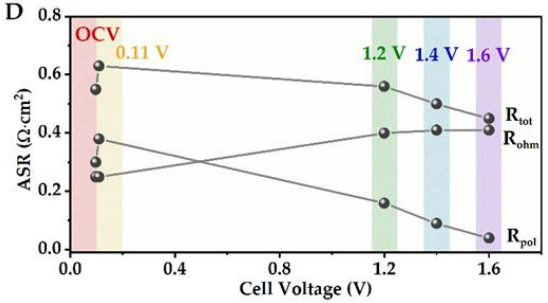
Research Topics

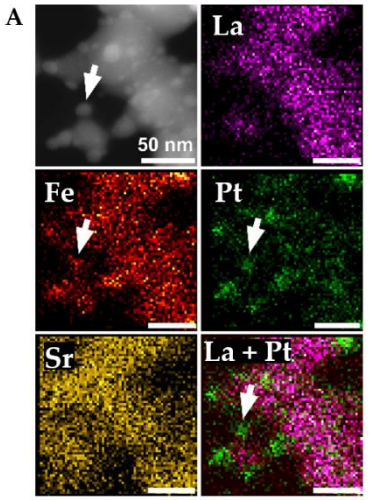
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

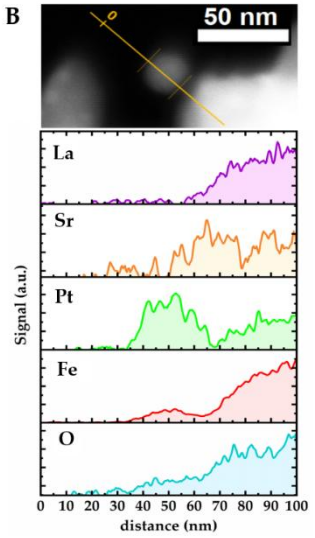
- Synthesis and characterization of oxides for oxygen electrocatalysis
- Development of oxides for high temperature electrolyzers/fuel cells

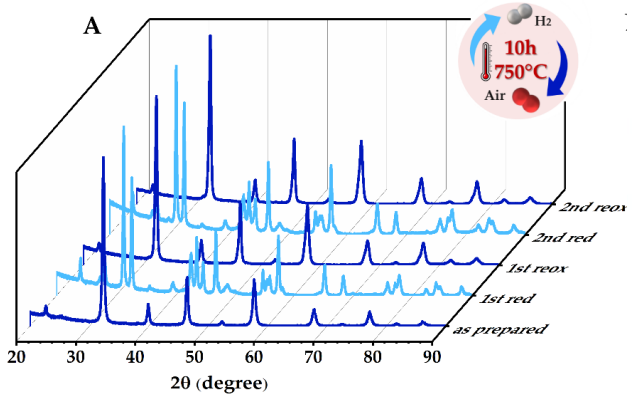


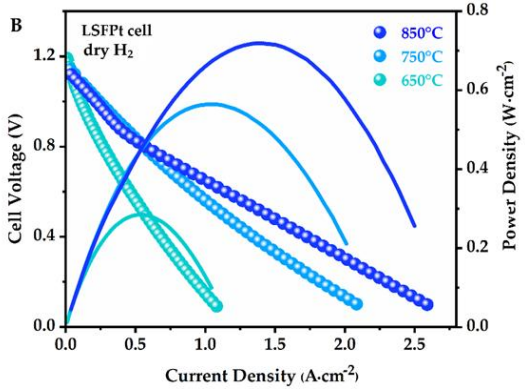












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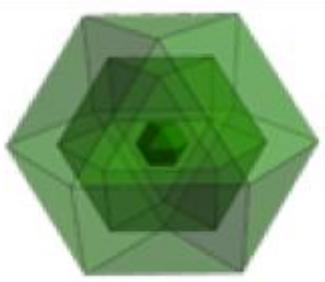
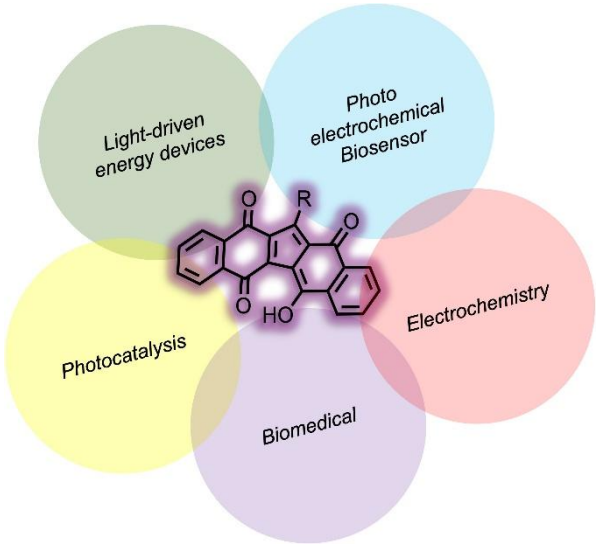
O2C Group – *Organic and Organometallic Chemistry*



Dr. Federica Sabuzi
Prof. Pierluca Galloni
Prof. Valeria Conte



RESEARCH ACTIVITIES

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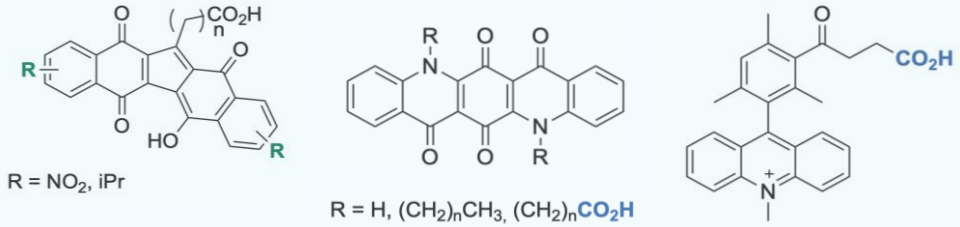
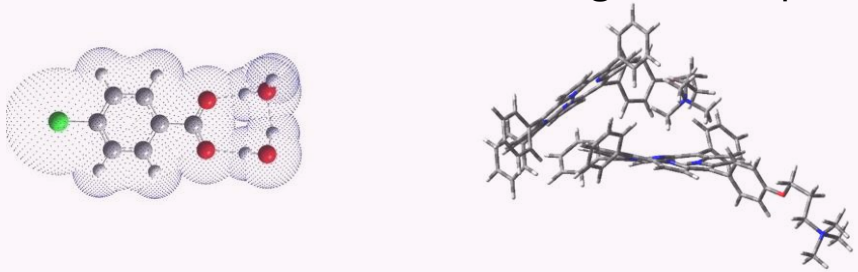
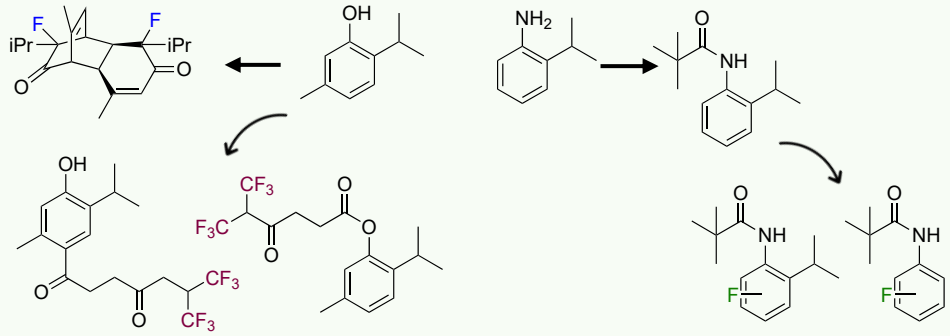
Synthesis and characterization of organic *dyes* for photo(electro)chemical applications



Computational study of molecular properties and intermolecular interactions of organic compounds



Tailored functionalization of natural compounds for biomedical applications



Collaborations: Prof. A. D'Epifanio (Università di Roma Tor Vergata); Prof. A. Sartorel (Università di Padova); Prof. A. Fontana (Università G. D'Annunzio di Chieti); Prof. S. Bettini (Università del Salento); Prof. X. Sala (Universitat Autonoma de Barcelona); Dr. N. Romero (Université de Toulouse); Prof. V. N. Nemykin (University of Tennessee).

Funded projects: NEST PNRR – *NANOCARB* High Surface Area Carbon Nanostructures as Electronic Transducers for Artificial Photosynthesis
PRIN 2022 – *PROMETEO* Photoelectrocatalytic modules for oxidative C-H activation

Research Activity

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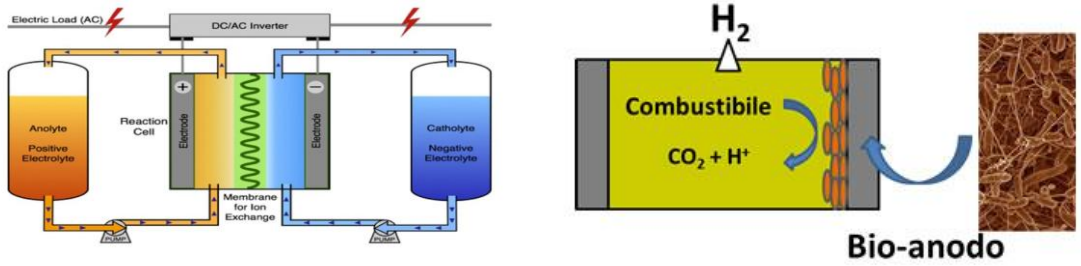
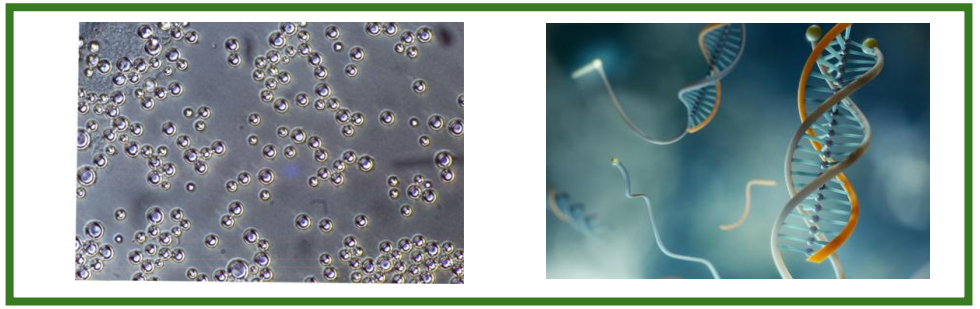
The Department of Chemical Science and Technologies has been selected as one of the 11 best Chemistry Departments in Italy.

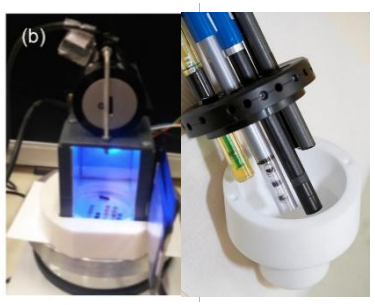
The X-Chem project involves the strengthening of three main lines of research:



Energy transition



Health



Environment

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University of Rome Tor Vergata
"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025», June 12th 2025

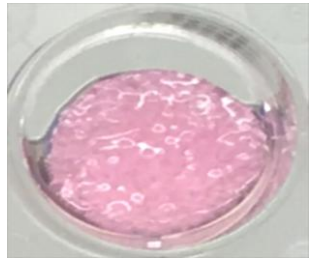
Biochemistry and Biomaterials for Tissue Regeneration

Sonia Melino's team:

Dr.ssa Silvia Buonvino
Dr. Gabriele Feltrin

Prof.ssa Sonia Melino

B&B4T LAB



RESEARCH ACTIVITIES

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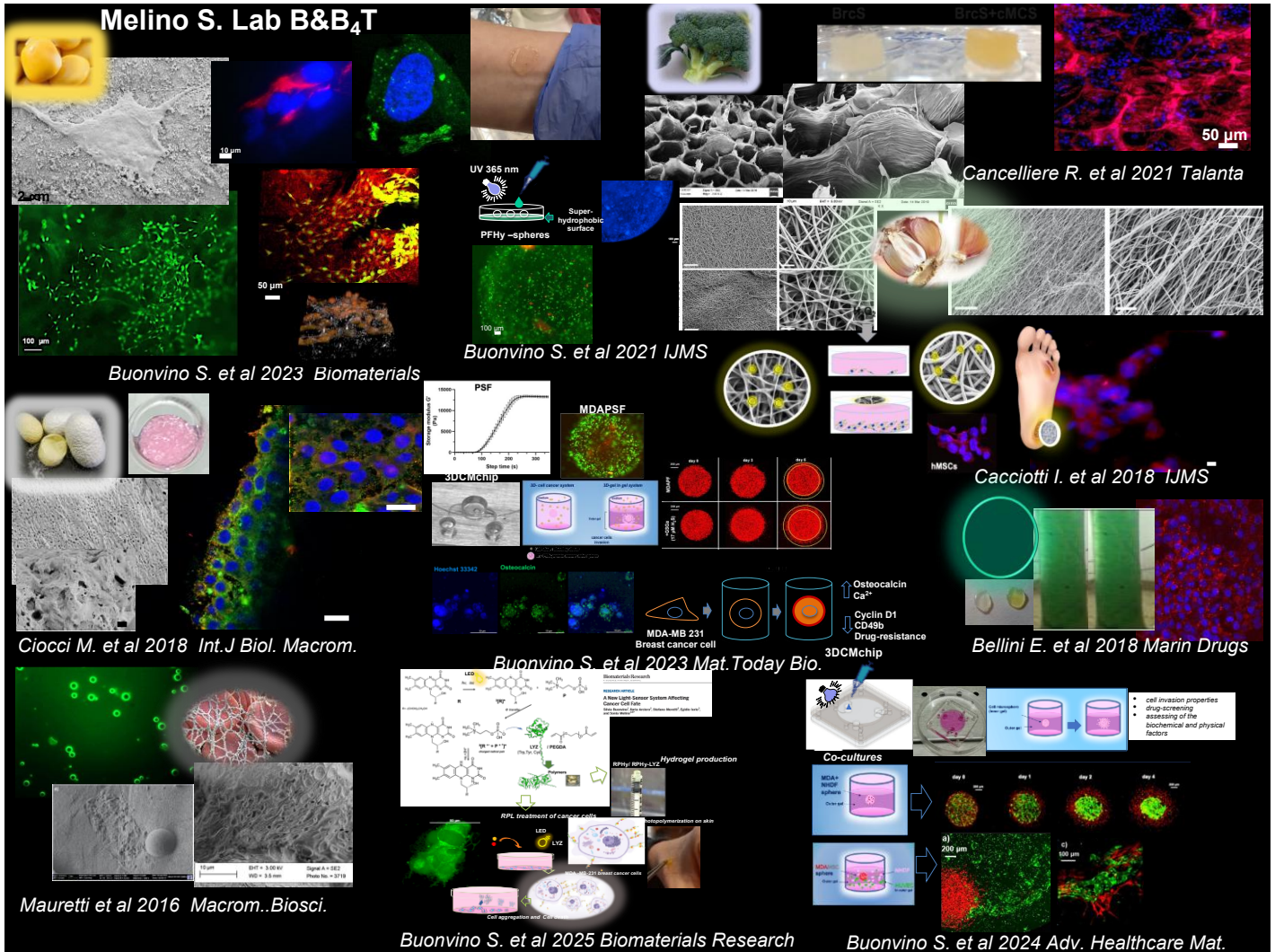
-Fabrication and Characterization of 3D cellular models for regenerative medicine and cance
- New biomaterials synthesis from wastes for cellular scaffold production



Projects

2022-2025 PI nel WP: *Modelling of 3D approaches of multicellular spheroids structures for estimating the risk of disease initiation and progression.* Progetto PNNR PE6 European Union Next Generation EU via MUR-PNRR HEAL ITALIA "Health Extended Alliance for Innovative Therapies, Advanced Lab-research, and Integrated Approaches of Precision Medicine

2023 **Principal Investigator** (PI) nel Progetto European Union Next Generation EU via Ministry of Health - HUB LIFE SCIENCE – Advanced Diagnostic- Italian network of excellence for advanced diagnosis (INNOVA)

Collaborations

Prof. D. Seliktar Technion Haifa
Prof. Ilaria Cacciotti University of Rome “Niccolo Cusano”
Department of Industrial Engineering
Prof. Giovanni Chillemi University of Rome Tor Vergata
Silvia Buonvino UniCamillus
Prof. M T Cambria University of Catania

June 12th 2025

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Bachelor's Degree in Materials Science and Master's Degree in Science and Technology of Materials
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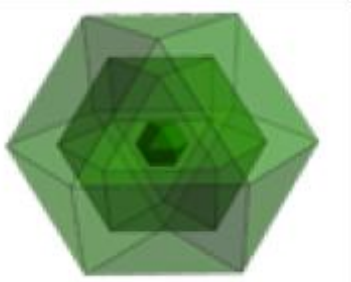
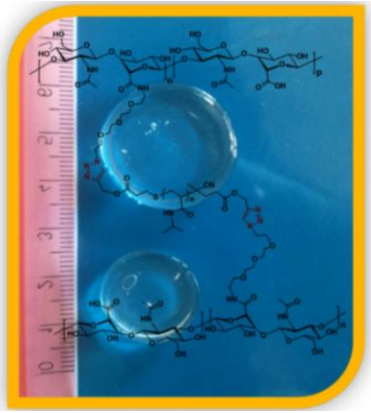
"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025», June 12th 2025

Physical Chemistry of Macromolecules

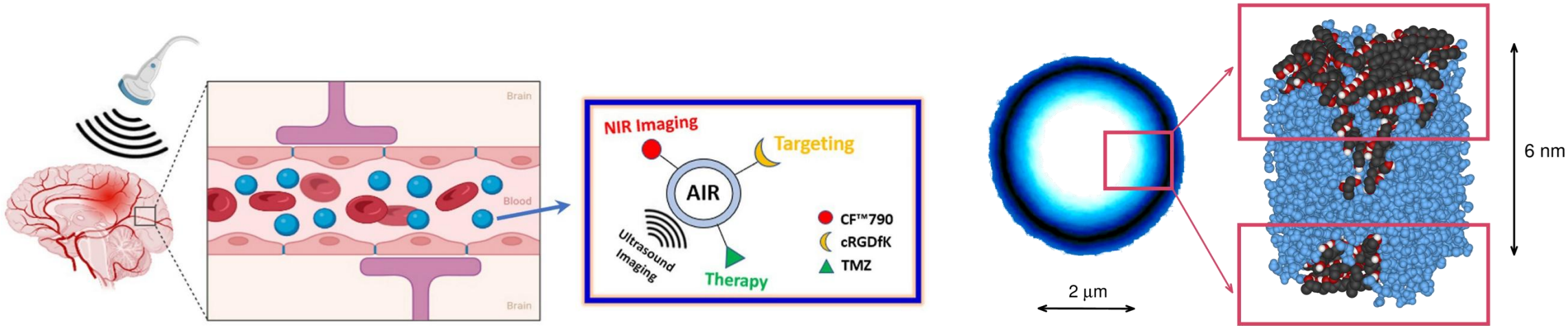


Gaio Paradossi
Ester Chiessi
Fabio Domenici



RESEARCH ACTIVITIES

Design and development of multi-responsive macromolecular systems for applications in biomedicine (imaging, drug delivery, tissue engineering), dosimetry, and conservation of cultural heritage



Multifunctional polymer-shelled microbubbles for selective targeting and elimination of brain tumors

European and Italian Projects: **EU**: **-** Microbubble driven multimodal imaging and theranostics for gliomas; **-** Acoustic markers for enhanced remote sensing of radiation doses; **-** Glioma Targeting by Drug Loaded Engineered Microbubbles; **IT**: **-** PRIN, Novel strategies for sensitized ultrasonic neuromodulation;

- BRiC: Study of cellular alterations induced by exposure to professional ultrasound; **-** INFN, Droplets as Injectable Dosimeters; **-** Umberto Veronesi Foundation: Engineered PVA-

RESEARCH ACTIVITIES

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Collaborations: *Department of Cardiovascular Sciences KU Leuven*; *DIBRIS University of Genova*; *The National Center for Oncological Hadrontherapy (Pavia, IT); Health Physics of Complex Structures of Radiation Oncology «Sant'Orsola» (Bologna, IT); Harwell Science and Innovation Campus Oxfordshire, UK*


G. Paradossi

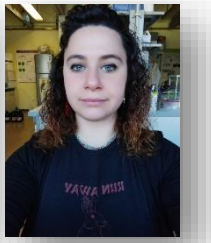

E. Chiessi


F. Domenici


Y. Toumia

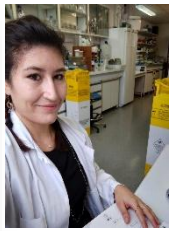

A. Vitaliti


G. Perilli


M. Redi


E. Bassotti


O. Eslek


M. Valenzuela


A. Tani

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Bachelor's Degree in Materials Science and Master's Degree in Science and Technology of Materials
University of Rome Tor Vergata
International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025
June 12th 2025

CARBONSITE
RESEARCH





Prof.ssa Silvia Orlanducci
Prof.ssa Emanuela Tamburri
Prof. Massimo Tomellini
Dott.ssa Valeria Guglielmotti
Dott. Massimo Longo

Research Activity

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

- The research activity focuses on the design, synthesis, and morphological–structural–functional characterization of materials for applications in the biomedical field, sensing technologies, environmental protection, cultural heritage preservation, microelectronics, energy, and catalysis.

- The materials of interest include innovative systems based on carbon, two-dimensional (2D) materials, conductive polymers, oxide and metal nanoparticles, as well as hybrid and composite materials.

Prof.ssa S. Orlanducci

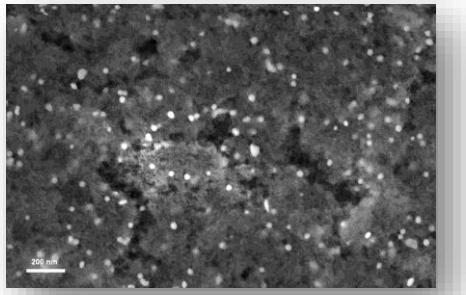
silvia.orlanducci@uniroma2.it

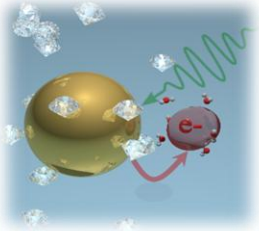
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

❖ ***Synthesis of nanodiamond/gold and nanodiamond/silver coupled particles for applications in plasmonics, catalysis, and sensing.***

CNR Istituto di Struttura della Materia

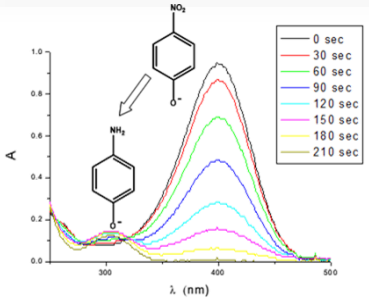
In collaboration with ISM-CNR
Dr Francesco Toschi
- Plasmonics -





In collaboration with
Prof.ssa Laura Micheli
- Electrochemical Sensors -
Prof. Riccardo Salvio
- Catalysis -

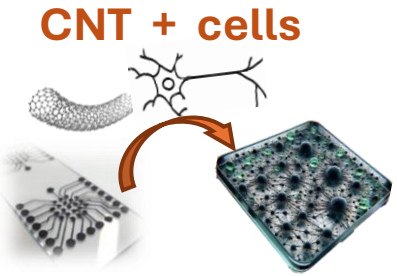
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA
Dipartimento di Scienze e Tecnologie Chimiche



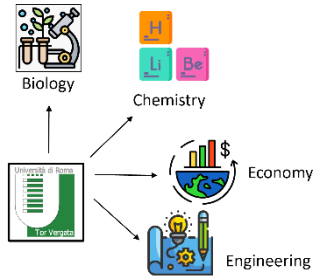
imem

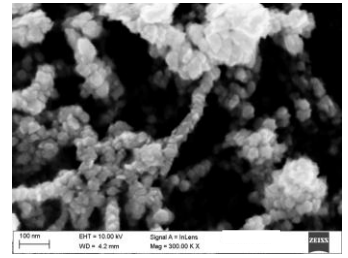
In collaboration with IMEM-CNR
Dr.ssa Silvia Battistoni

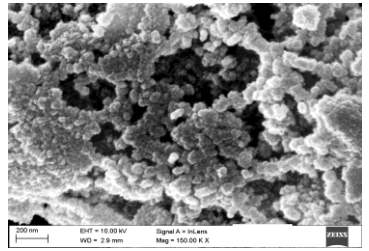
❖ ***Realization of CNT-based hybrid networks for cellular interfacing***



❖ ***Reuse and upcycling of domestic wastewater***







Zero Mile© is the system already designed for the up-cycling of dishwasher wastewater

Nanodiamonds is the project to up-cycle the plastic microfibers from washing machine into nanodiamonds

Funding by the Italian Ministry of the Environment and Energy Security

MINISTERO DELL'AMBIENTE E DELLA SICUREZZA ENERGETICA

Prof.ssa E. Tamburri
emanuela.tamburri@uniroma2.it

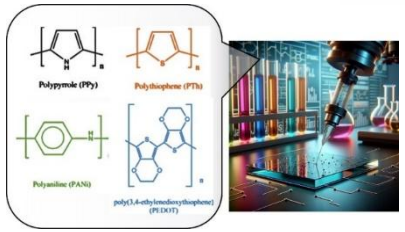
Dott. M. Longo
massimo.longo@uniroma2.it

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

In collaboration with IMEM-CNR
Dr.ssa Silvia Battistoni

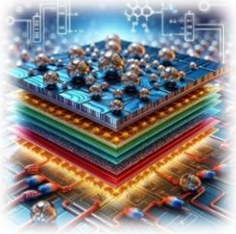
- ***Synthesis and characterization of electrically conductive materials for 3D printing or inkjet for applications in organic electronics***

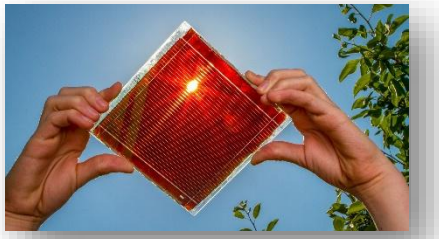
- ***Printing and characterizations of flexible electronic circuits***

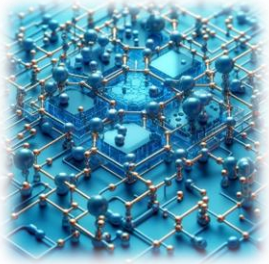


In collaboration with ISM-CNR
Dr Francesco Toschi

- ***Conjugated Polymer Nanostructures for Organic Electronic Devices***
- ***MXene-Based Systems for Batteries and Supercapacitors***
- ***Synthesis and Characterization of Perovskite Nanostructures for Optoelectronic Devices***



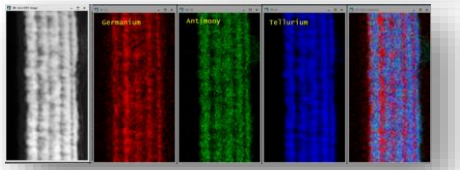




In collaboration with IMM-CNR
Dr.ssa Raffaella Calarco

- ***Sputtering-RF Deposition of Chalcogenide Thin Films and Multistructures for Phase Change Memory (PCM) Applications***

  — ***These systems enable neuromorphic computing with low consumption and are applicable to sustainable mobility (safety and energy efficiency)***



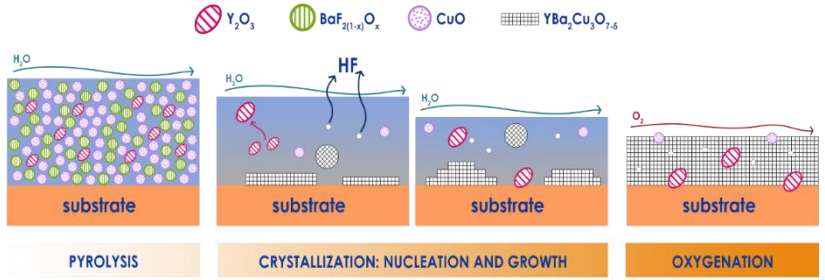
Project: PRIN2020 EMPHASIS - NEuroMorPHic devices bASed on chalcogenIde heteroStructures – prot. 20203K2T7F_002 [2022-2025]

Prof. M. Tomellini
tomellini@uniroma2.it

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

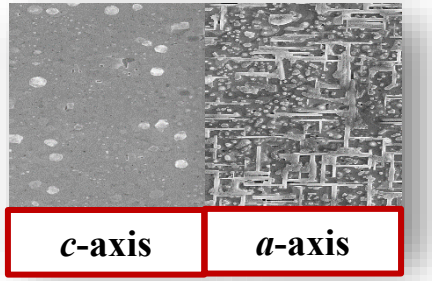
ENEA
Agenzia Nazionale per le Nuove tecnologie, l'Energia e lo Sviluppo economico sostenibile

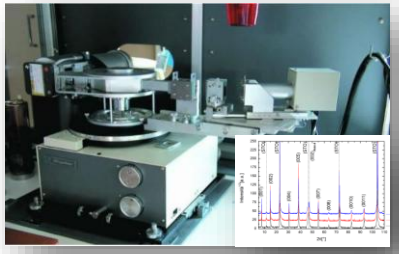
In collaboration with ENEA
Dr.ssa Valentina Pinto



- ***Nucleation and Growth Study of High-Tc Superconductors***
- ***Synthesis of YBCO by Solution Deposition Process, for Oriented Growth:***

— ***structural, morphological and superconducting characterization by XRD, SEM, optical microscopy and R(T) (Resistance-Temperature)***

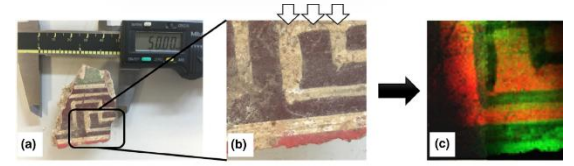


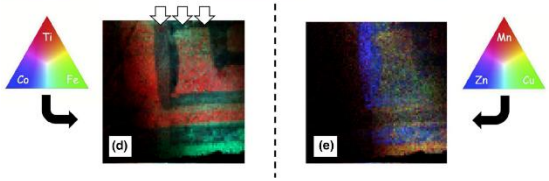


Dott.ssa V. Guglielmotti
valeria.guglielmotti@uniroma2.it

In collaboration with XlabF (INFN-LNF)
Prof. Sultan Dabagov
Dr. Dariush Hampai

INFN LNF
Istituto Nazionale di Fisica Nucleare
Xlab-Frascati





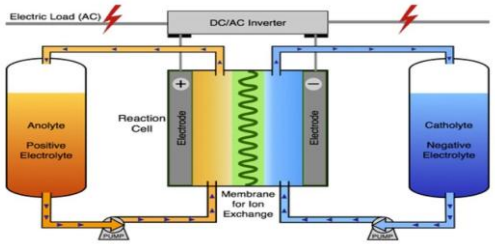
- ***XRF and XRD maps using polycapillary focusing systems for the non-destructive analysis of pigments and paint layers in cultural heritage***

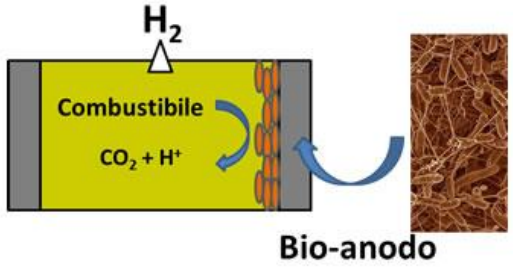
Research Activity

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

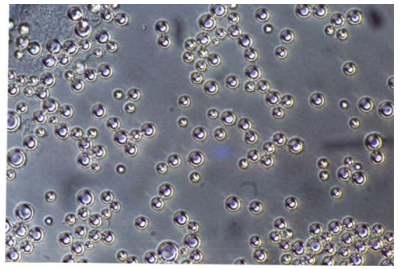
The Department of Chemical Science and Technologies has been selected as one of the 11 best Chemistry Departments in Italy.

The X-Chem project involves the strengthening of three main lines of research:

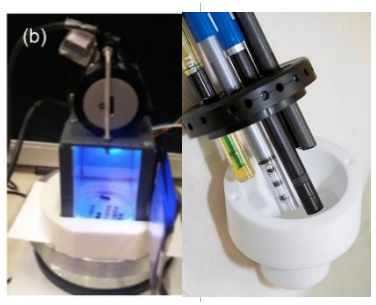


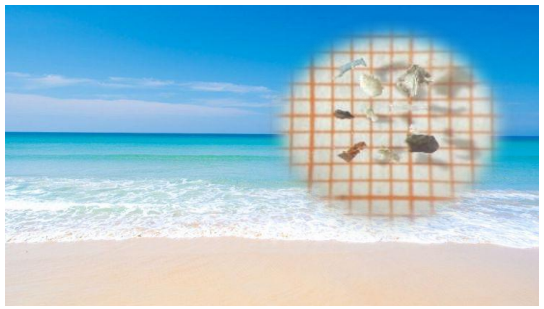


Energy transition



Health





Environment

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UNIVERSITÀ DEGLI STUDI DI ROMA

Bachelor's Degree in Materials Science and Master's Degree in Science and Technology of Materials
University of Rome Tor Vergata
"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025», June 12th 2025

Nature-Inspired Functional Materials

Prof. Emanuela Gatto
Dott.ssa Raffaella Lettieri
Prof. Mariano Venanzi

Research Activity

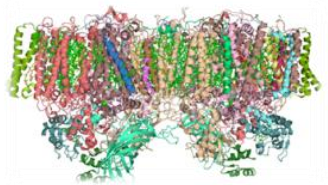
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Solar cells

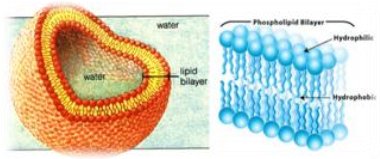
CHOSE
POLO SOLARE ORGANICO
REGIONE LAZIO

Bioplastics

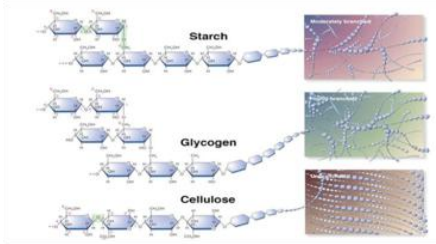
DNA



PROTEINS

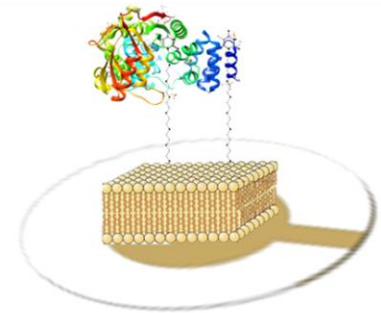


PHOSPHOLIPIDS

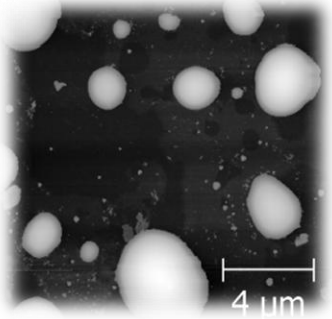


POLYSACCHARIDES

Experts in natural polymers for applications in the field of sustainable materials



Sensors



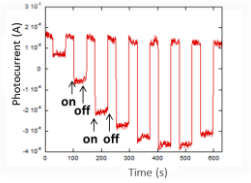
Medical devices

SPlastica
PLASTICA SOSTENIBILE

SPINOFF
UNIVERSITÀ DEGLI STUDI
DI ROMA TOR VERGATA

Research Projects

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA



Biopolymer-based organic solar cells

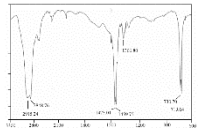
National Research Doctorate in Photoinduced Processes and Technologies

Prof. Aldo Di Carlo, dott. Luigi Vesce CHOSE
Dott.ssa Marta De Zotti, University of Padua

Use of wine waste for the production of sustainable materials

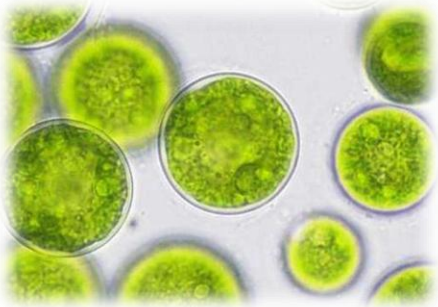
PON Doctorate
RTDA PON- REACT EU-DM1062/2021

Prof. Silvia Licoccia, prof.ssa Elisabetta Di Bartolomeo, Tor Vergata



Analysis and identification of micro- and nanoplastics in seawater samples

Dr. Raffaella Bullo, Polytechnic University of Marche
Prof. Susanna Dolce, Luisa Campagnolo, Nicola Toschi, Medicine Department Tor Vergata



Synthesis and characterization of bioplastics from microalgae

Dr. Viviana Scognamiglio, dr. Amina Antonacci, CNR

PRIN 2022 project NanoGRAB

SPlastica
PLASTICA SOSTENIBILE

SPINOFF
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DI ROMA TOR VERGATA

MUR

PON
RICERCA E INNOVAZIONE

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025"
Presentation of the scientific activities at Tor Vergata
June 12th, 2025

NEw Materials for Optoelectronics

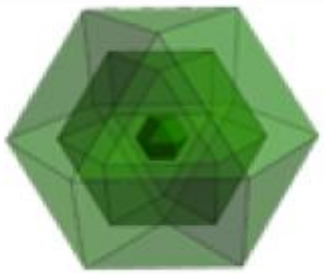
Prof. Paolo Prosposito

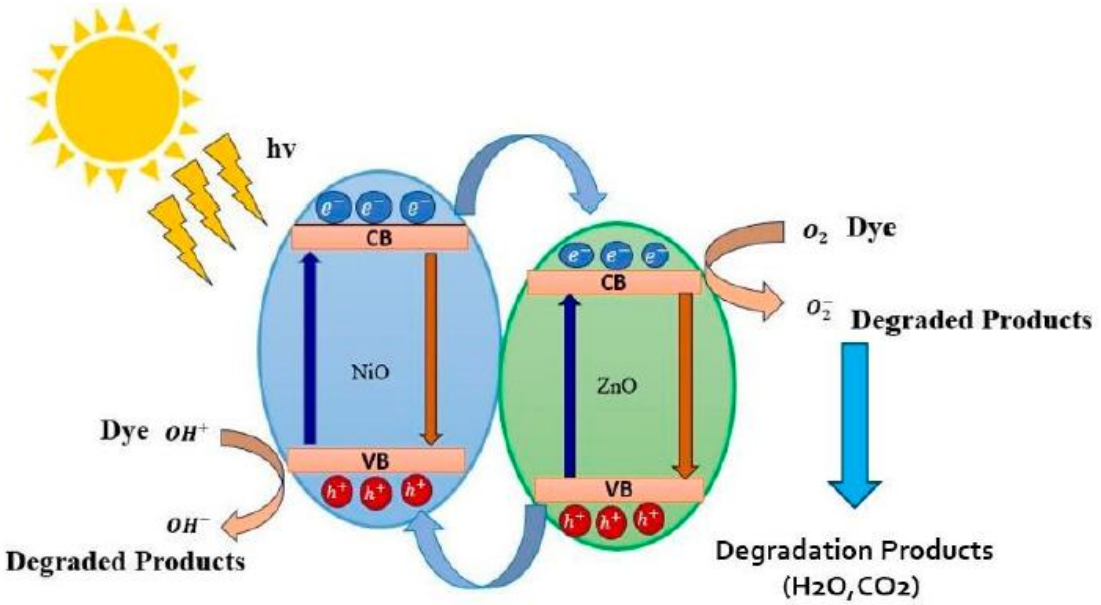
paolo.prosposito@uniroma2.it

Luca Burratti

Sadaf Jasmine

Fabio De Matteis

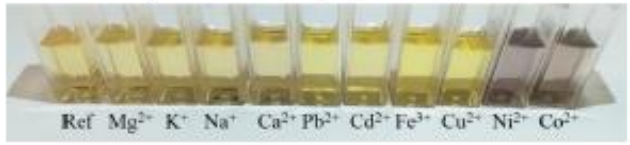


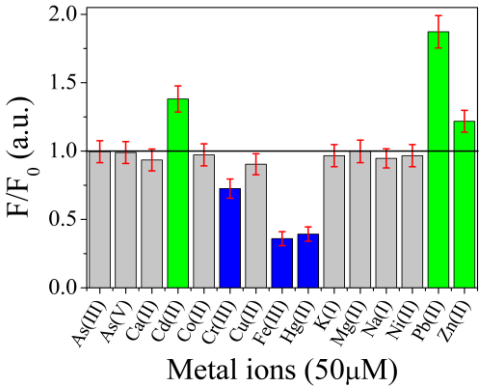


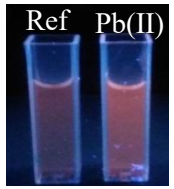
NeMO Lab

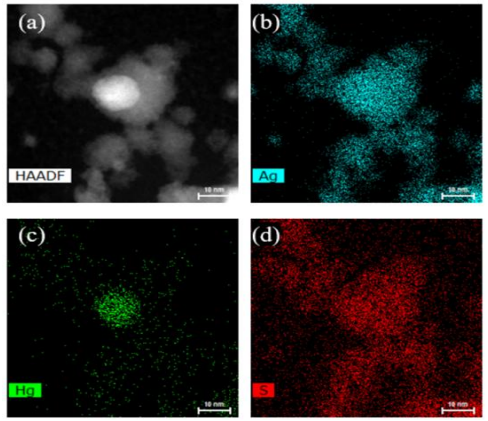
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

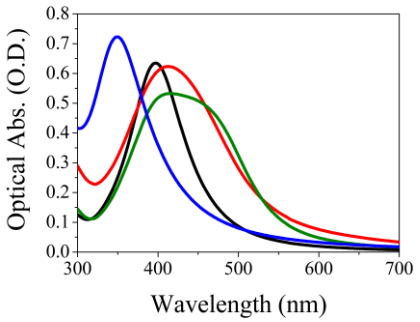
Heavy metal-ion optical sensors based on absorption and/or fluorescence by Silver nanostructures

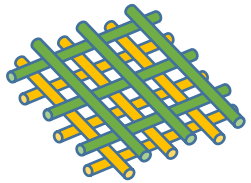


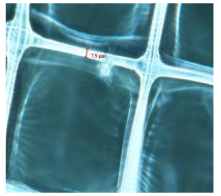




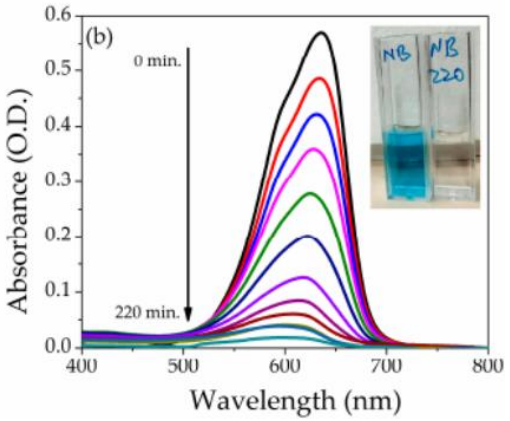


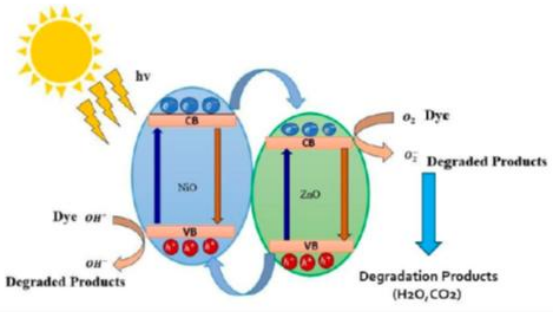




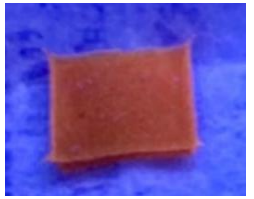


Photocatalytic degradation of organic pollutants by means of metal oxides

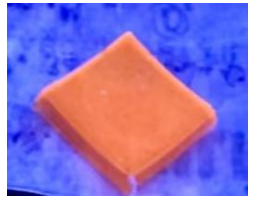




Water filtration with 3D printed polymer filters



Pb(II)



Prior to interaction

Following the interaction

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025"
Presentation of the scientific activities at Tor Vergata
June 12th, 2025

NEw Materials for Optoelectronics

INFN

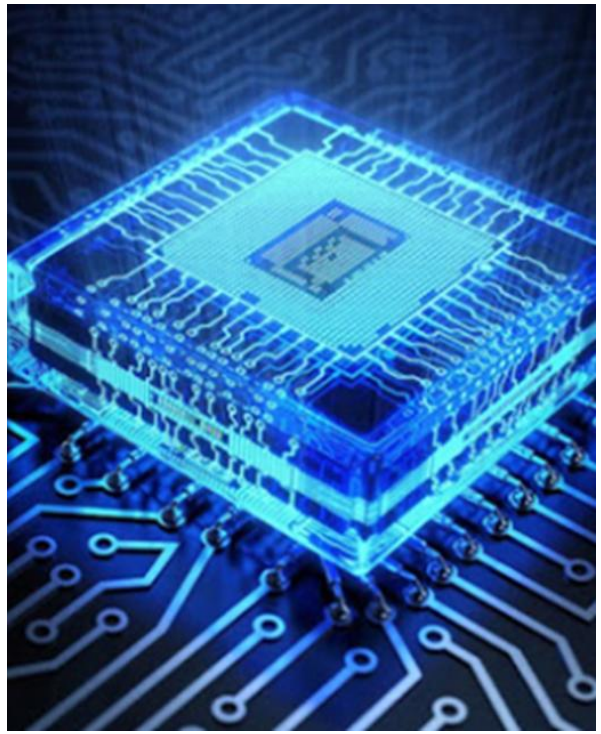
Prof. Fabio De Matteis

fabio.dematteis@uniroma2.it

Luca Burratti

Andrea Salamon (INFN)

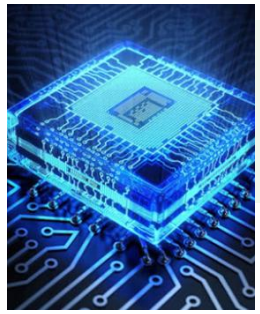
Thu Ha Dao (INFN)



Silicon Photonics Lab

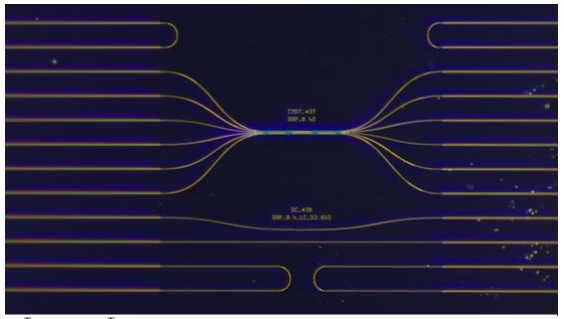
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

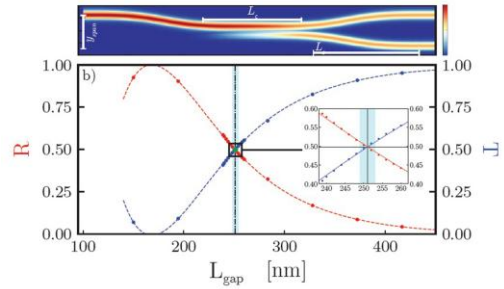
QUANTEP-Experimental Platform for Quantum Technologies

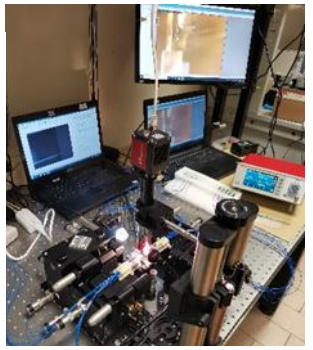


Creation of a platform based on Silicon Photonics for development and characterization of circuits for quantum computing in linear optics;

- Integration of SPD (single photon detectors);
- Integration of SPS (single photon sources);
- Integration of polarization control circuits.





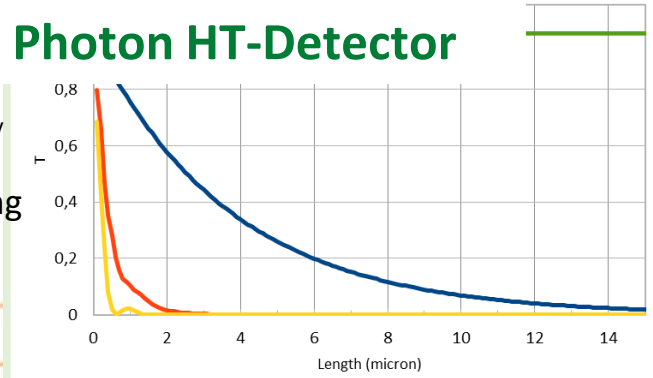


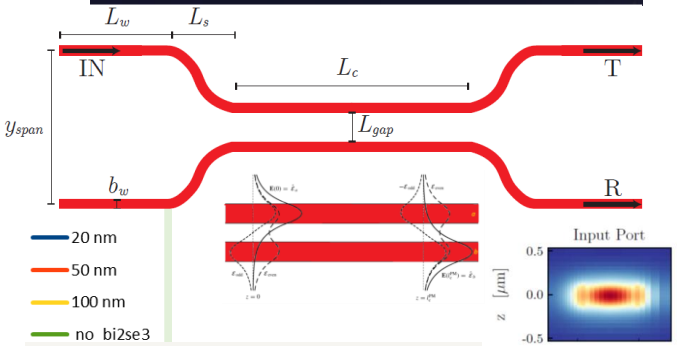
INFN **CSN5 Project**

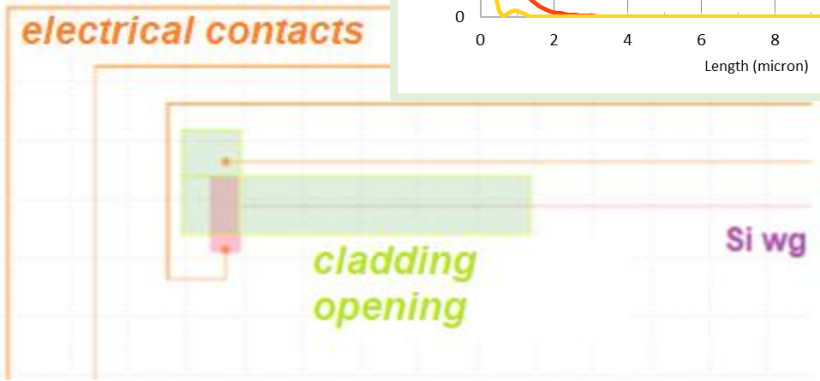
Wavelength 1550.752 nm

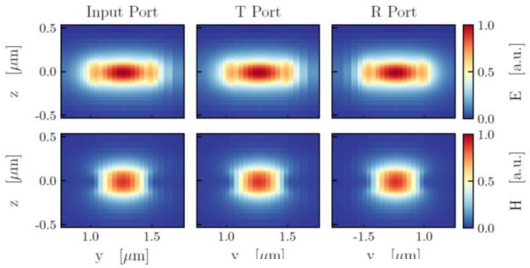
Integrated Single Photon HT-Detector

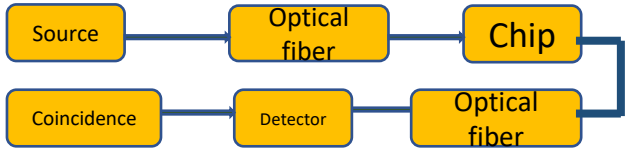
Si/Bi_2Se_3 and $Si/Bi_2Se_xTe_y$ Heterogiunction in evanescent wave coupling (M. Salvato)







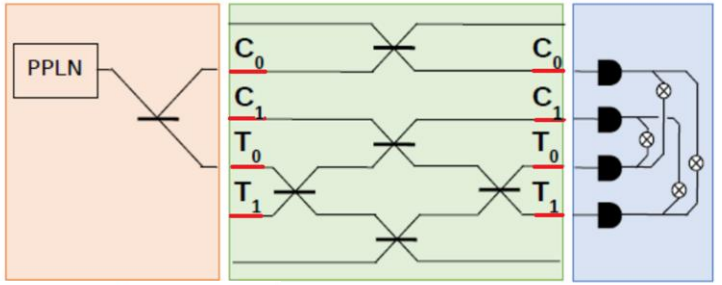




Photon-pair Generation

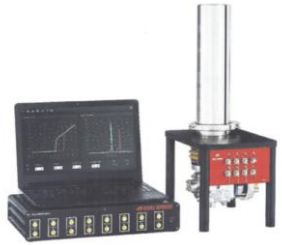
CNOT-gate

Coincidence Detection



Ansys Lumerical
Software Package for Photonics Simulation & Design

FDTD – Finite Difference Time Domain solver
MODE - EigenMode Expansion (EME) solver



TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025"
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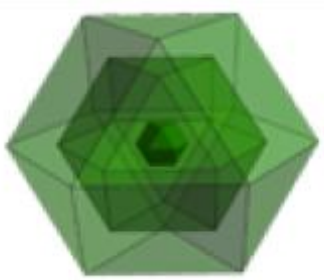
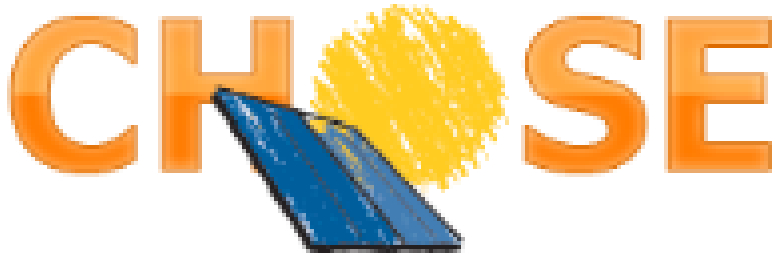
June 12th, 2025

CHOSE, Centre for Hybrid and Organic Solar Energy

Thomas M. Brown
Andrea Reale
Francesca Brunetti
Matthias Auf Der Maur
Antonio Agresti
Fabio Matteocci
Aldo Di Carlo





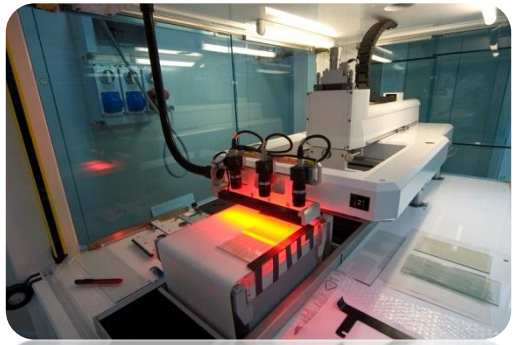
Research Activities

Materials and processes for new generation photovoltaics with organic and perovskite semiconductors

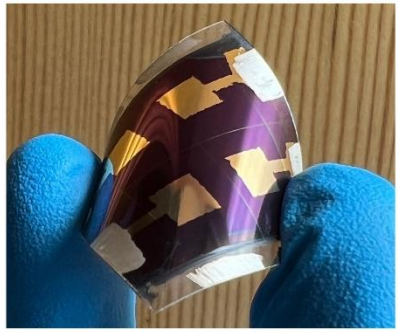
Deposition through printing techniques (but also thermoelectric devices, supercapacitors, artificial retinas...)

Inks

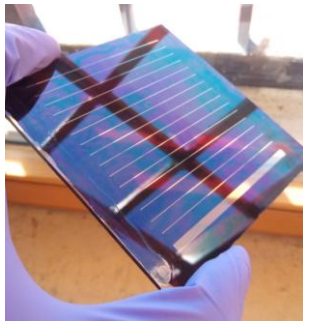
Printing Techniques

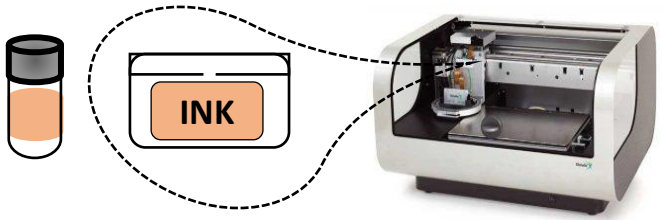


Solar cells & other devices

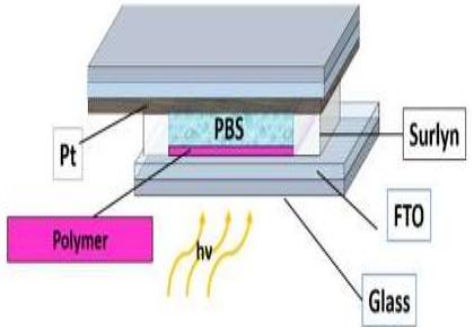


Photovoltaic modules

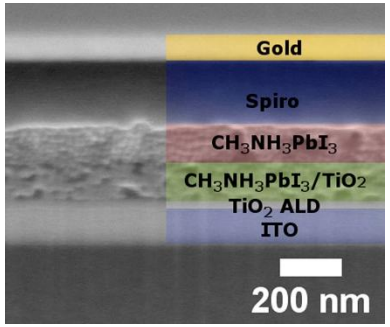




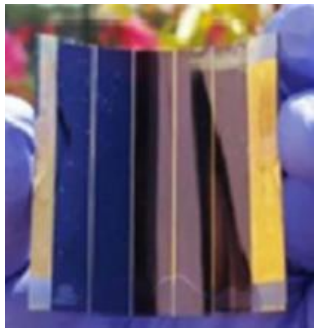
Biohybrid devices



Nanostructured Multilayers



Even flexible



Resaerch Projects Available

Perovskite Photovoltaics

Organic Photovoltaics

Thermoelectric Devices

Bio-Hybrid Devices and Artificial Retina Supercapacitors

Tandem Cells

Light Harvesting Outdoors, Indoors & in Space

Flexible Solar Cells

TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

"International Synergies in Photonics and Materials Science: Double Degree Dialogue 2025"
Presentation of the scientific activities at Tor Vergata
June 12th, 2025

Metallurgy and Materials Science

Prof. Alessandra Varone
alessandra.varone@uniroma2.it

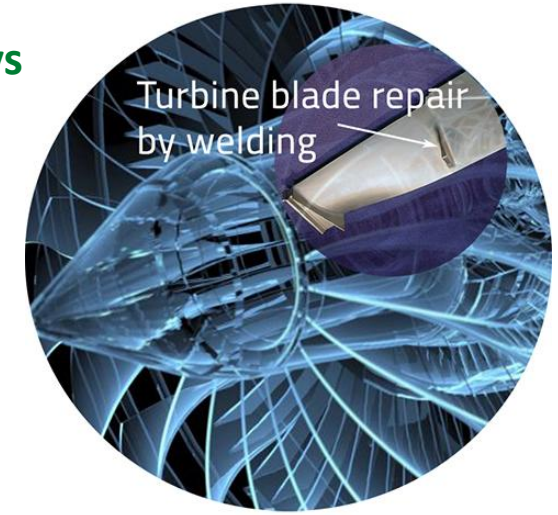
Prof. Maria Richetta
Alessandra Palombi

Research Activity

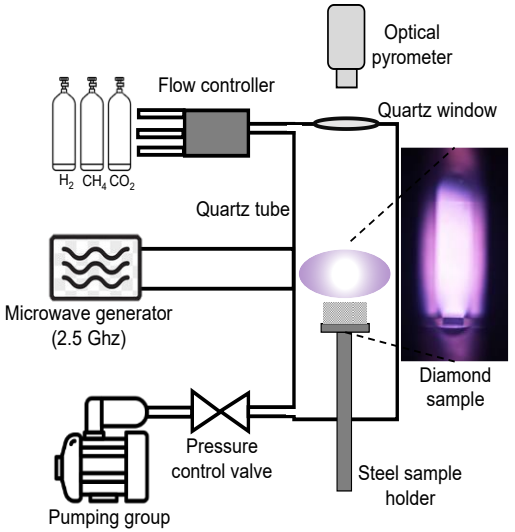
TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

1) Welding and repair of Ni-Superalloys

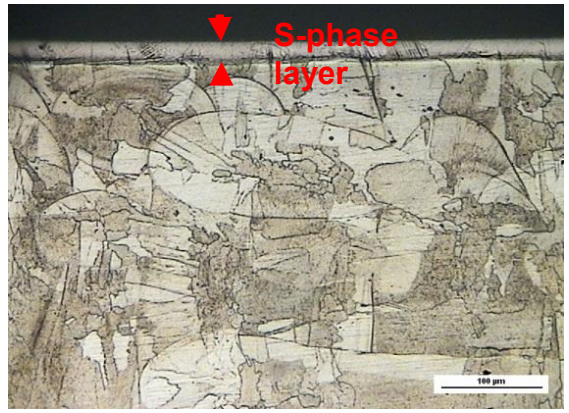
Laser welding of Ni-superalloys for aerospace applications.



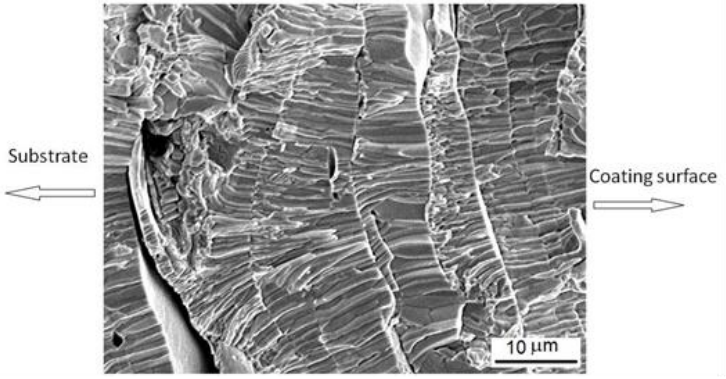
2) Plasma-assisted thermochemical treatment of austenitic stainless steels



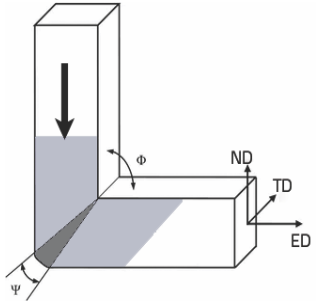
Optimization of parameters (temperature, plasma atmosphere, duration) of the low-temperature (T<500 °C) thermochemical cementation treatment with plasma-assisted process for stainless steel 316L.

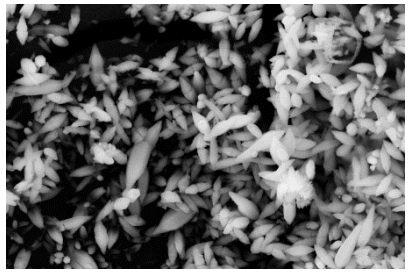


3) Materials for structural applications in fusion reactors



4) Metallic materials for biomedical applications





5) Additive manufacturing of metallic materials. Lattice structure.

6) Characterization of metallic materials by means of: XRD, optical and electronic microscopy, instrumented indentation, mechanical spectroscopy

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June 12th, 2025

Material Science and Technology group

Prof. Ing. Francesca Nanni fnanni@ing.uniroma2.it
Dott. Ing. Mario Bragaglia bragaglia@ing.uniroma2.it
Dott. Ing. Lorenzo Paleari
Dott. Elisa Pizzi

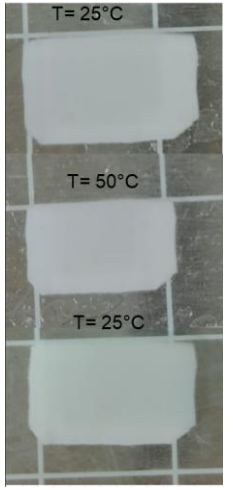
Research Activity

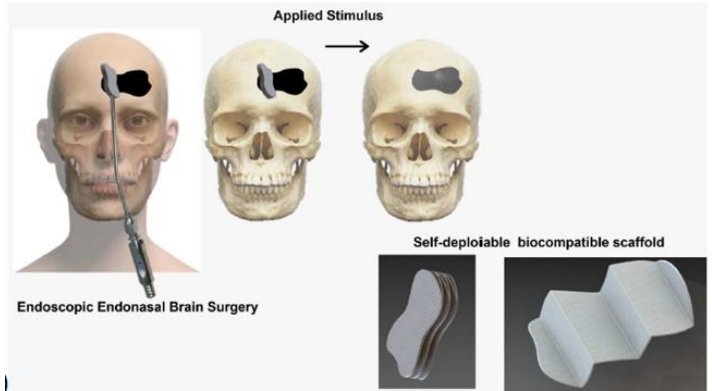
R&D and technological transfer in the field of Material Science and Technology.

Polymers, composites, elastomers, ceramic, metallic and cement materials, with particular emphasis on multifunctionality, additive manufacturing (3D printing) and sustainability.

3D printing

Temperature responsive material (PCM)





- 3D printing of shape-memory materials (4D Printing)
- 3D printing of biobased scaffolds
- Innovative Hosts for Phase Changing Material (PCM) (Thermal applications)

www.materiali.ing.uniroma2.it