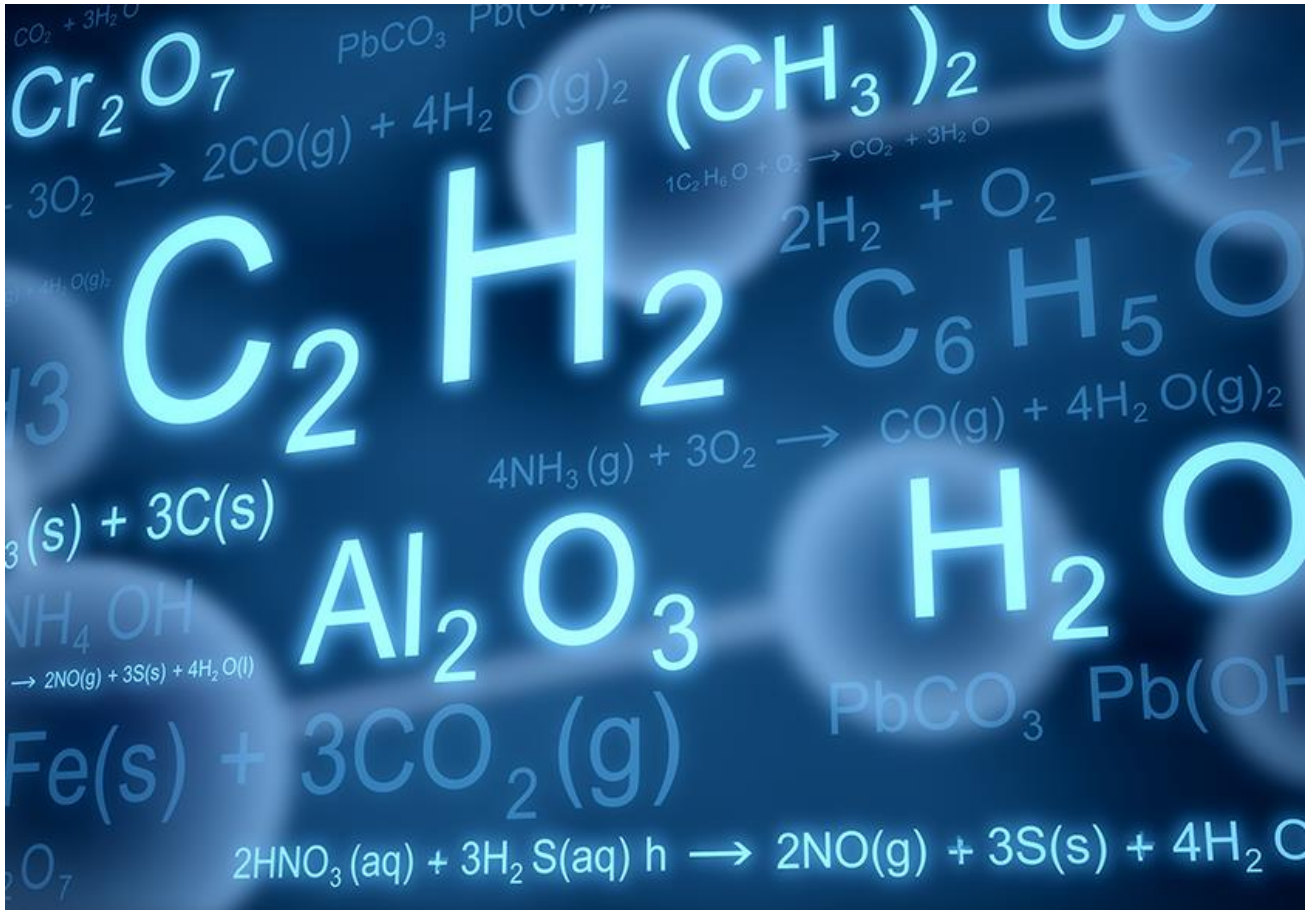
DEPARTMENT

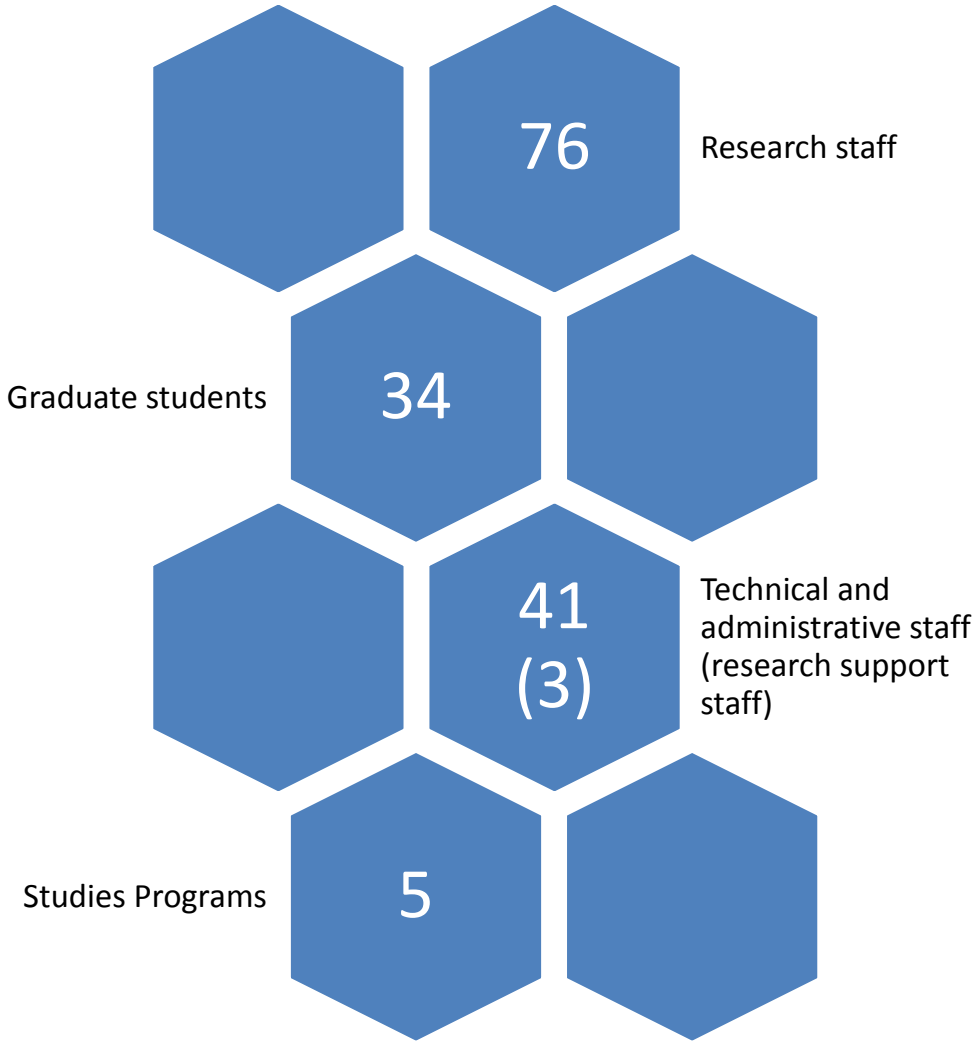
CHEMISTRY AND INDUSTRIAL CHEMISTRY

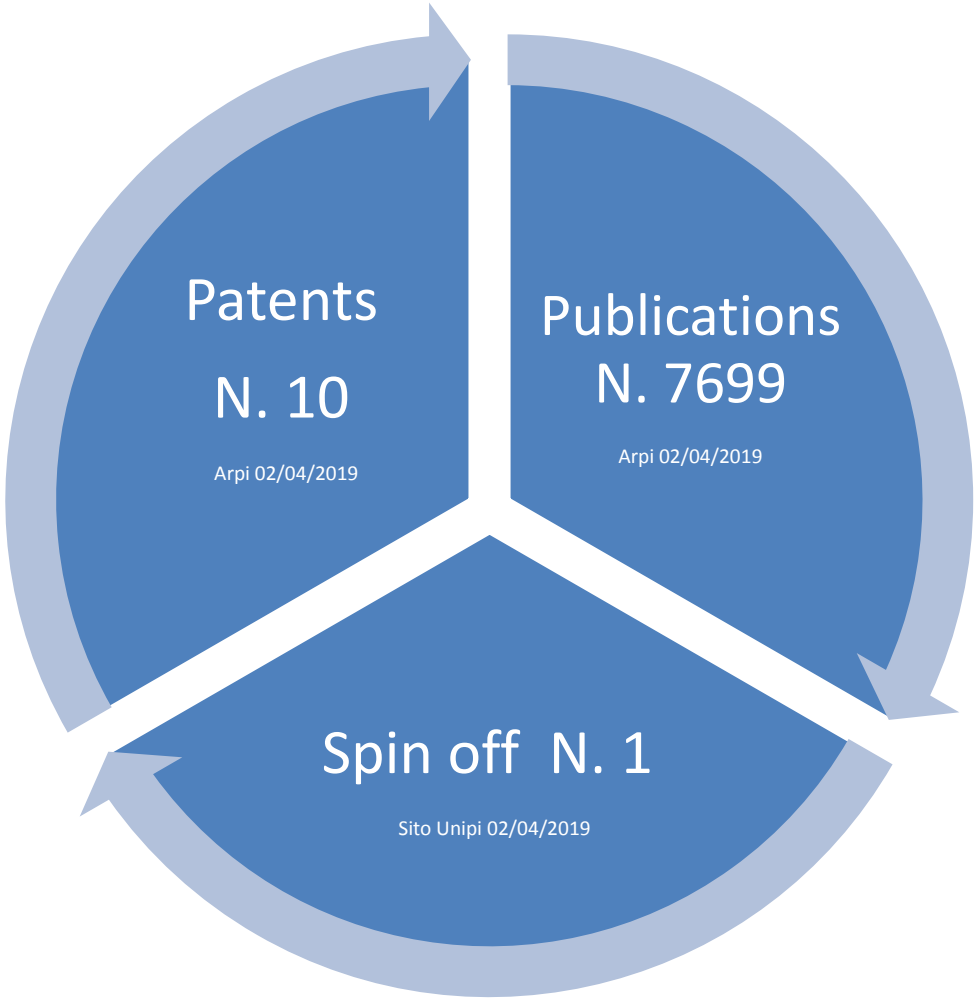


"EVERY ASPECT OF THE WORLD TODAY – EVEN POLITICS AND INTERNATIONAL RELATIONS – IS AFFECTED BY CHEMISTRY"

LINUS PAULING

DEPARTMENT AT A GLANCE





RESEARCH AREAS

Inorganic chemistry	Synthesis, Reactivity, and Catalysis of inorganic and organometallic compounds Magnetic and plasmonic nanoparticles for optoelectronic and biomedical applications
Computational and physical chemistry	Multi-scale models to treat environment effects in quantum chemistry and to simulate light-triggered changes in materials and biomolecules Solid state NMR, calorimetric and thermo-analytical techniques for pharmaceuticals, biological macromolecules, polymers, inorganics and composites
Polymer chemistry and Green industrial processes	Polymer-based materials and nanocomposites for smart systems and advanced applications Process innovation adopting renewable feedstocks, sustainable conditions, novel catalyst
Organic chemistry	New synthetic pathways to bioactive compounds and organic materials Structural elucidation of organic compounds and of supramolecular structures
Analytical, Clinical and Environmental chemistry	Advanced analytical tools in Archaeometry and in Diagnostics for Cultural Heritage Monitoring of pollution, from marine plastics litter to toxics in remote polar environments Chemical characterization of biological fluids for human health monitoring

RESEARCH PROJECTS

POR-FSE
NMR4DES - Design of new high-performance nanocomposite elastomeric materials driven by Solid-State Nuclear Magnetic Resonance.
MS-MOMUS - Portable SIFT Mass Spectrometry to investigate VOCs in Museum Environment
BARRIER - NIR reflective bituminous and thermoplastic sheaths for energy saving coatings

FAR-FAS
PROT-ONE New eco-friendly power systems for coastal and inland navigation: study of Li-ion battery safety.

POR FESR
COOLSUN New NIR-reflective “cool” organic pigments
MITICO New tanning agent from catalytic conversion of local raw or waste biomass

POR CREO
SMOOTH Smart devices for air quality MonitOring and human health
E-QUALITY4LOGISTICS Soluzioni ICT per il trasporto intelligente delle merci

MIUR-PRIN 2017
Q-ChiSS Quantum detection of chiral-induced spin selectivity at the molecular level (PE4)
HARVEST Learning from natural pigment-protein complexes how to design artificial light-harvesting systems (PE4)
Functional supramolecular polymers for self-diagnostic composites (PE5)
CHIRALAB Towards a CHeap and portable InstRument for bioAnaLysis based on enAntiospecific luminescence and aBsorption essays (PE5)

PNR 2015-2020 (Cultural Heritage)
AGM for CuHe: Advanced Green Materials for Cultural Heritage

PNRA16_00020 (Programma Nazionale di Ricerche in Antartide)
Antarctic Porifera: Hot-spots for prokaryotic diversity and biotechnological potentialities

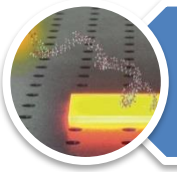
LIFETimes (ERC-ADG No. 786714)
Light-Induced Function: from Excitation to Signal through Time and Space

BIOMOTIVE (BBI H2020 No 745766)
Advanced BIObased polyurethanes and fibres for the autoMOTIVE industry with increased environmental

POTION (FETPROACT-01-2018 No 824153)
Promoting social interaction through emotional body odours

KARDIATOOL (H2020-NMBP-2016-2017 No 768686)
An integrated POC solution for non-invasive diagnosis and therapy monitoring of Heart Failures patients

RESEARCH IMPACT



Technology transfer

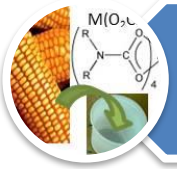
- New materials, chemical processes and devices developed and patented
- Spin off companies and collaborations with local , national and international companies

Healthcare

- New tools for IT–based diagnostics
- Smart materials for therapeutics and tissue engineering
- Analytical protocols and techniques for human health monitoring

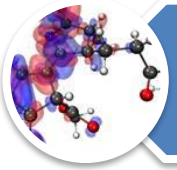
Cultural Heritage

- New polymeric and nanotechnological protectives and consolidants for conservation
- Analytical tools for archaeometric investigations and diagnostics of deterioration



Environment

- Analytical protocols and techniques for monitoring marine and remote areas pollution
- Processes and catalysts for biomass-to-chemical conversion and low-impact polymeric materials



Energy

- Next generation materials for sunlight harvesting in photovoltaic devices and for energy saving applications
- Modelling light and environment in complex systems – towards molecular-based light conversion devices