“EVERY ASPECT OF THE WORLD TODAY — EVEN POLITICS AND INTERNATIONAL RELATIONS — IS AFFECTED BY CHEMISTRY”

LINUS PAULING
Department at a Glance

- Research staff: 76
- Graduate students: 34
- Technical and administrative staff (research support staff): 41 (3)
- Studies Programs: 5

- Publications: N. 7699
  - Arpi 02/04/2019
- Patents: N. 10
  - Arpi 02/04/2019
- Spin off: N. 1
  - Site Unipi 02/04/2019

Chemistry and Industrial Chemistry
### Research Areas

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

**POR-FSE**
*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.

**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)

**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

**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

**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*

**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