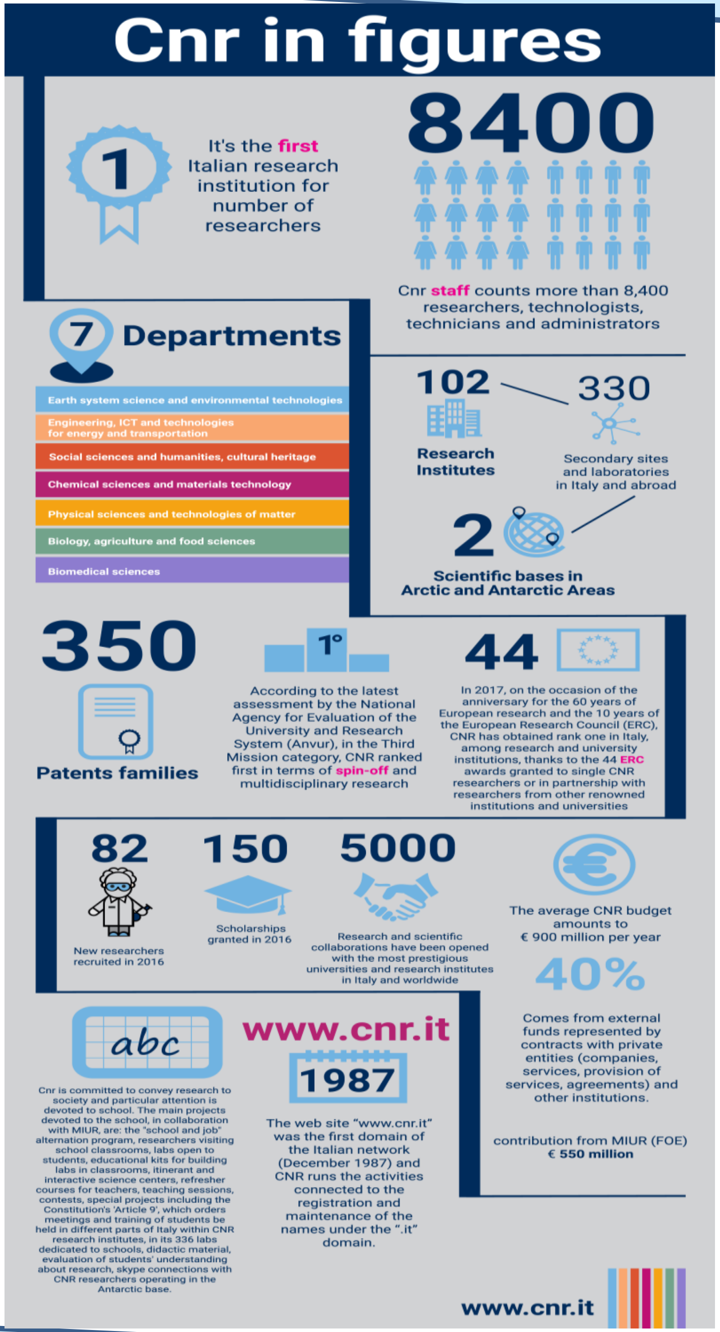
7 Conferenza nazionale sulla Chimica Sostenibile
L'Innovazione al centro della transizione verso una società sostenibile e inclusiva,
Milano 30 gennaio 2020 – Auditorium FEDERCHIMICA

Il CNR per la valorizzazione della Ricerca: il Progetto PROMO-TT Instrument

Barbara Angelini – Project Manager

CNR in Figures



CNR TT MISSION

- ✓ By leveraging our experience in IPR management, spin-off creation and technology marketing, we build bridges between CNR and all segments of the industrial world.
- ✓ We are an integral part of the community of CNR researchers. It is our mission to create value by exploiting new technological solutions that are developed by CNR scientists, in order to obtain better products and services with a positive impact for society as a whole.

PROMOTT

instrument

State of the art

Other Public Research Institutions have tools to promote research results which, however, with respect to the tool to be proposed, present the following critical issues:

- Sectoral limitations;
- Absence of a large part of the information of interest to SMEs (the TRL rarely appears; the stage of industrial development is not evident; absence of the type of innovation proposed ...);
- Difficulty finding information of interest to SMEs;
- Technology sheets drawn up with language alien to the world of SMEs;

In none of the promotional forms is it indicated which method of collaboration is deemed necessary for the enhancement of technologies (eg Seed Capital, Licensing, Collaboration Ag with the Productive World and / or with other Research Institutions).

Mission

Establish greater interaction between Public Research and the Productive World, aimed at creating new partnerships and enhancing the results of CNR research, through the systemization of a shared methodology

PROMOTT instrument

Main activities

- ✓ Definition and start of scouting phases within the CNR Scientific Network of technologies of possible interest for the productive world;
- ✓ Definition and constitution of specific evaluation commissions with the participation of subjects coming from the different areas with competences in the TT for the evaluation of the scouting cards received;
- ✓ Definition, design and implementation of an on line DB including the technology promotion cards (protected, protectable, know-how and/or available for future creation of new start-up companies) consultable for thematic areas and **<u>available in Italian and English</u>**;
- ✓ **<u>Development of promotion activities both at national and international level</u>**.

Advantages

- ✓ Unique and easy to use environment for the promotion of technologies with different degrees of maturation and in different thematic areas;
- ✓ Technological cards validated by commissions of experts also from the world of Industry and Services;
- ✓ Promotional cards drawn up with information of interest and language understandable by SMEs and investors;
- ✓ A unique scouting and evaluation exercise for all thematic areas (annual scheduling);
- ✓ Creation of a national network of researchers (including other professional profiles of the CNR) "TT-aware".

PROMOTT instrument

Actors

From CNR

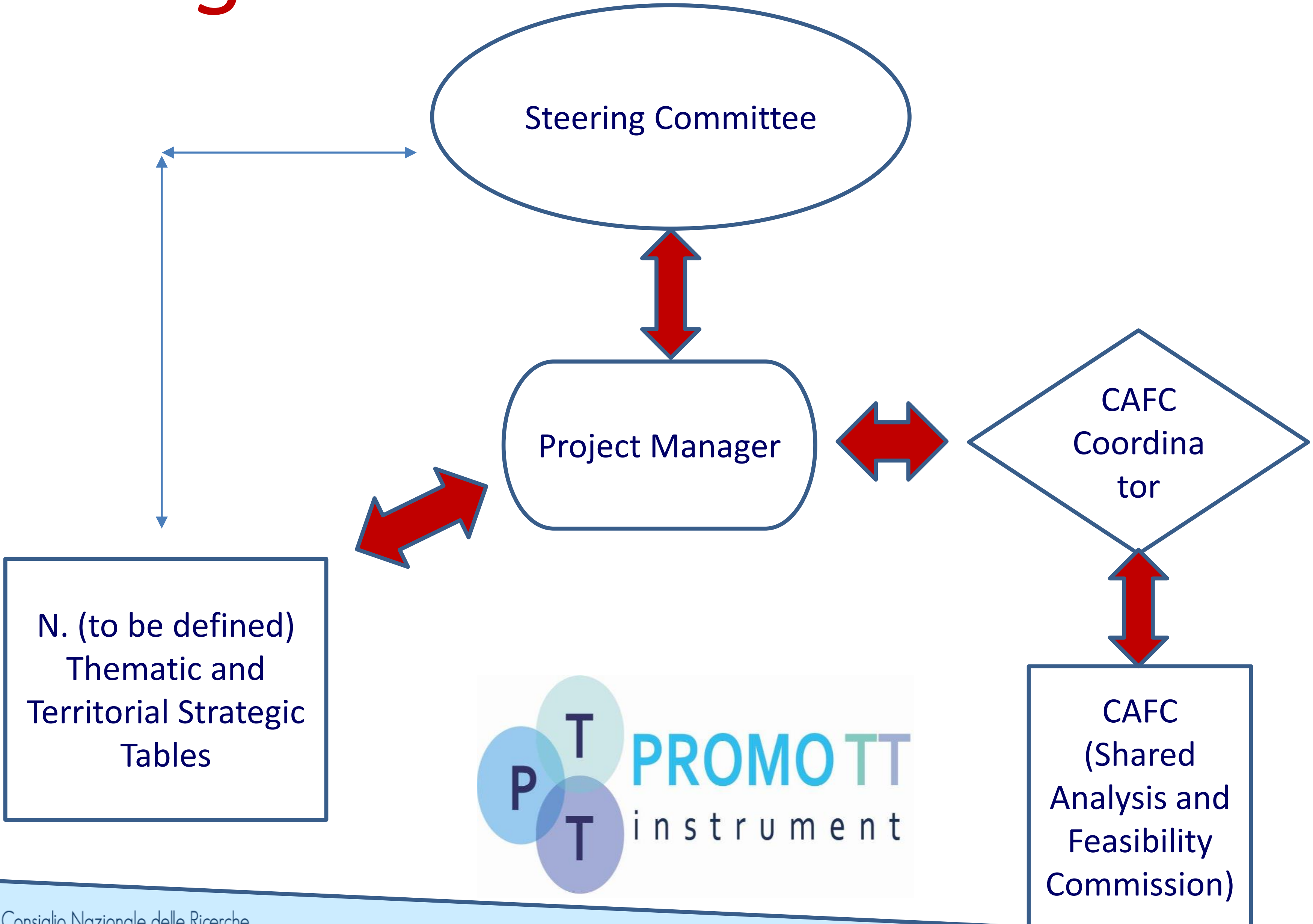
- CNR Technology Transfer Office;
- TT referents of the 7 CNR departments;
- CNR-Office for European and International Relations;
- "TT-aware" pro-active CNR researchers

From the World of Industry and Services

- Category Associations;
- Actors from the productive/industrial world

PROMOTT instrument

Organization chart



Expected results

- Greater awareness and involvement of the Scientific Network in TT activities
- Mapping of a greater number of technologies of potential interest for the market
- Increase in TT activities developed in collaboration with stakeholders
- More promotion events

Barbara Angelini
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Istituto di Chimica del Riconoscimento Molecolare

ISMAC

istm
istituto di scienze e tecnologie molecolari

Milano – via Mario Bianco
S. S. Milano Politecnico
S. S. - Roma Cattolica

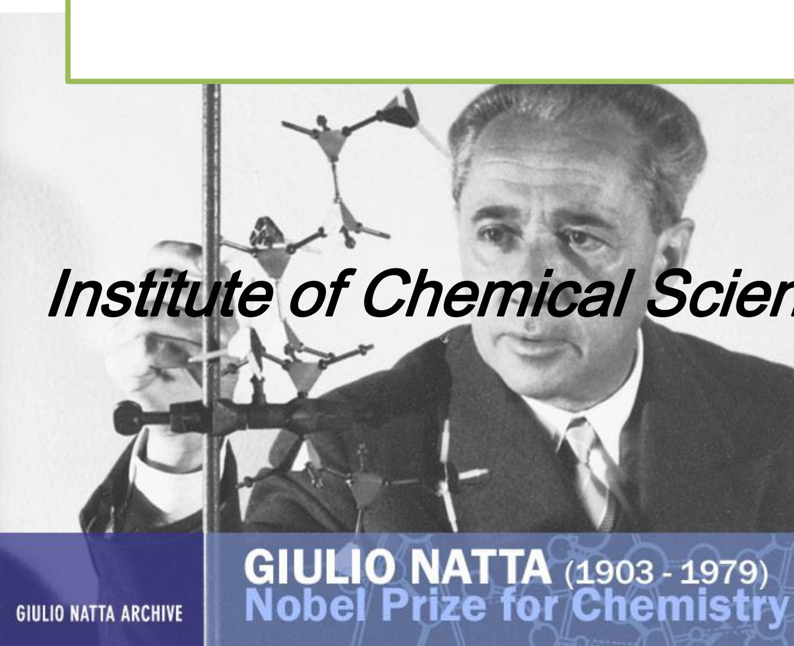
Milano – via Alfonso Corti
S. S. Genova

Milano – via Camillo Golgi , UniMI
S. S. Milano – via Fantoli
S. S. - Perugia , UniPG

Istituto di Scienze e Tecnologie Chimiche “Giulio Natta”
SCITEC

Institute of Chemical Sciences and Technologies “Giulio Natta”

Date of birth: 1 ottobre 2019



SCITEC : Staff by location

SEDI	Researcher Technologist	Technical and Administrative	Associates
MILANO	73	22	30
GENOVA	6	4	1
PERUGIA	10	1	6
ROMA	9	2	5
	98	29	42

SCIENTIFIC ACTIVITY

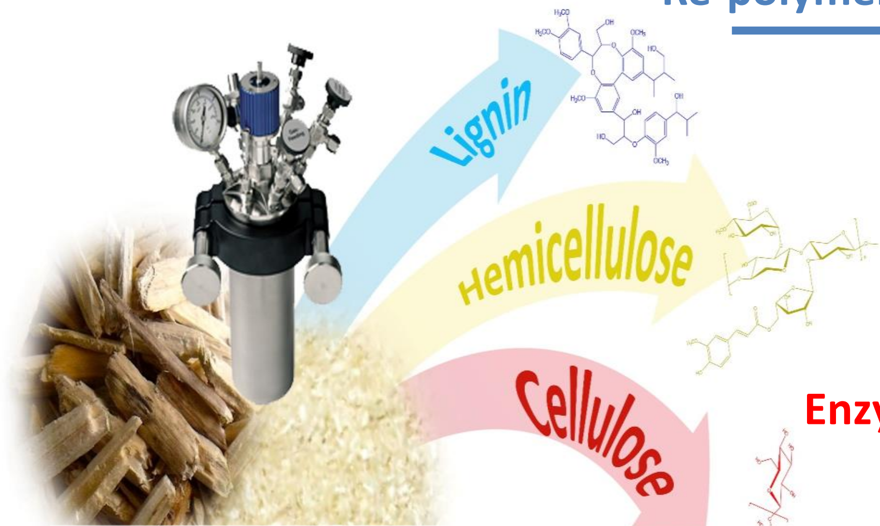
	GREEN CHEMISTRY	CHEMISTRY AND ENERGY	CHEMISTRY FOR LIFE SCIENCES	ADVANCED MATERIALS	CHEMISTRY FOR CULTURAL HERITAGE	COMPUTATIONAL MODELING
SEDE	☺	☺		☺		
M. BIANCO	☺		☺			☺
POLITECNICO	☺		☺			
UNIMI	☺	☺				☺
FANTOLI				☺		
GENOVA				☺		
PERUGIA					☺	☺
ROMA			☺			☺

Basic	Applied
Additional to Knowledge	Solution to existing problems
Discovery / Invention	Innovation / Application
Mere Academic	Practical use for solving problems

Green Chemistry

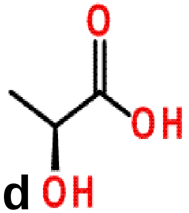
Lignocellulosic biomass valorization

wheat, hemp, corn



Re-polymerization

Fermentation



LacticAcid

Enzymatic hydrolysis

Fermentation

Total recovery 0.42 $g/g_{biomass}$

Ee >99%

Organosolv treatment

Biomass loading

Reaction time

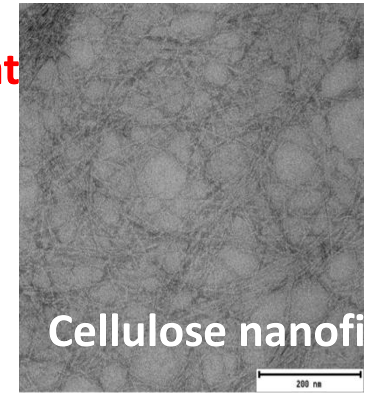
Temperature

Pressure

Catalyst

Solvent

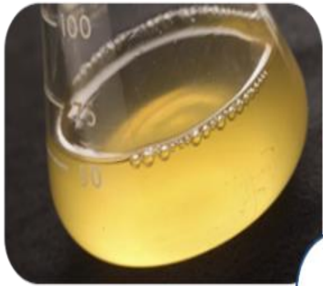
Microfluidizat



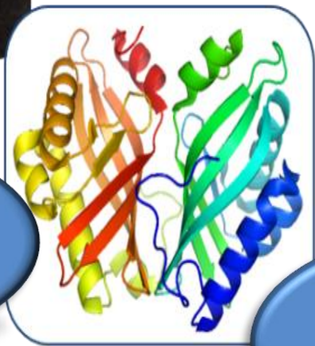
gianluca.ottolina@scitec.cnr.it

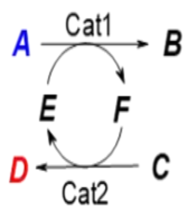
Biocatalysis for Sustainable and Green Economy

Biocatalysis exploits **enzymes** (or whole cells) as natural **catalysts** in chemical processes



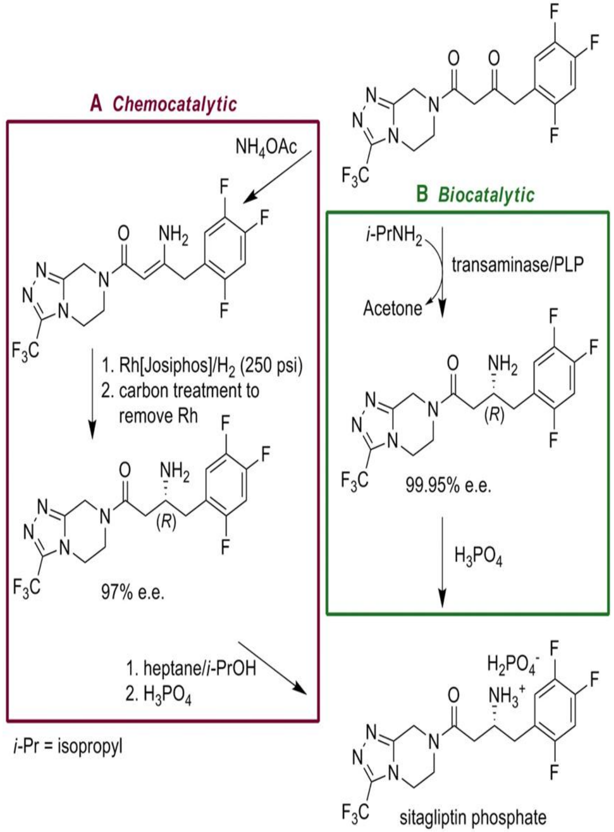
Design and development of new catalysts





New enzymes
metagenomics
protein engineering

New processes
immobilization
flow systems



ADVANTAGES

- Higher catalytic **efficiency** compared to chemical catalysts
- Higher **selectivity** (enantio-, stereo- and regioselectivity allowing resolution, no protection/deprotection steps…)
- Less secondary products → easier **downstream processes**
- **Mild reaction conditions** (physiologic pH and T, solvent-free)

APPLICATION FIELDS

Detergents
Leather
Specialty chemicals
Food
Diagnostics
Textil
Pharmaceutics
Quality control

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Green Chemistry

Fondazione CARIPLO

INNOVHUB
STAZIONI SPERIMENTALI PER L'INDUSTRIA

"Ricerca integrata sulle biotecnologie industriali e sulla bioeconomia – edizione 2017"

CIRCO

www.progettocirco.it

istm istituto di scienze e tecnologie molecolari

intercos GROUP

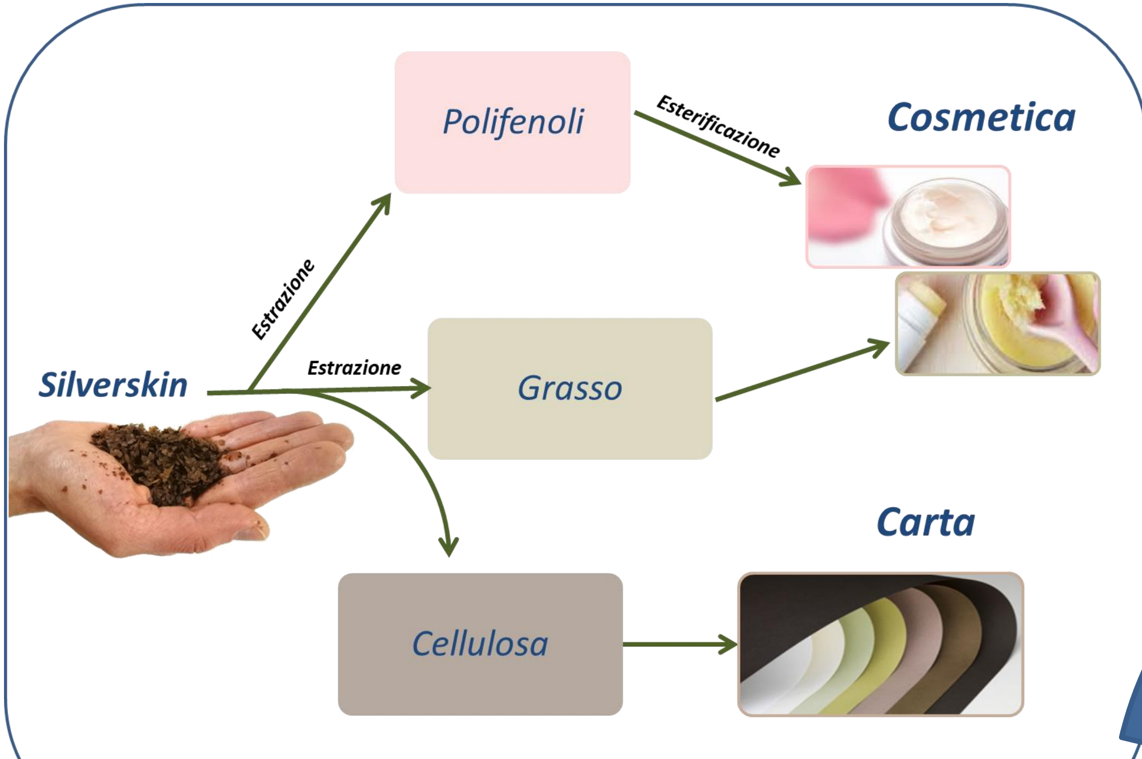
FAVINI

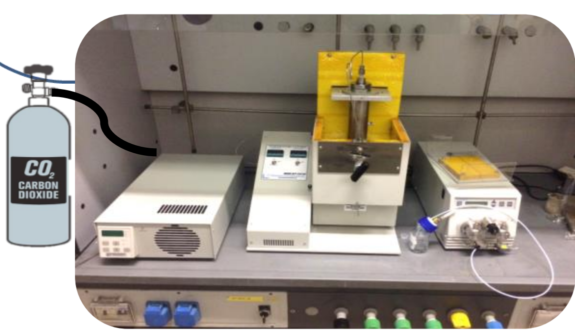
eurac research

"Multi valorization of silverskin, a residue of the coffee roasting industry"

nicoletta.ravasio@scitec.cnr.it

	C14:0	C16:0	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C22:0	C24:0
Coffee Silver Skin	1.2	30.2	6.6	6.2	25.0	0.6	12.1	0.3	15.6	2.1
Spent Coffee Ground	-	32.8	7.3	11.5	43.7	0.6	3.0	-	0.5	--





Fat with unusual composition

Rich and creamy texture characterized by a luminous finish, high writing and good adhesion in application

only 15%

GWP (Global Warming Potential)

emissions reduction $CO_{2\ eq}$ 0,75 Kg

0,62 Kg /Kg carta

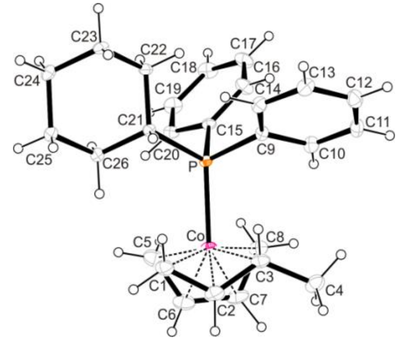
PED (Primary Energy Demand)

Reduction from 16,9 MJ

14,8 MJ/Kg carta

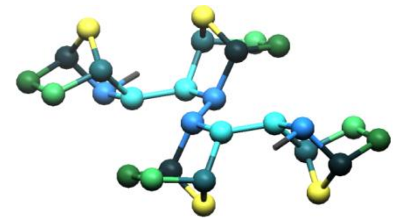
Advanced Materials

FROM CATALYSTS TO NOVEL POLYMERS AND ELASTOMERS

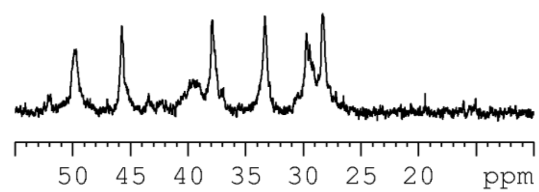


Novel catalysts

Polymerization



Characterization



Processing

Materials

- Synthesis, and characterization of thermoplastics and elastomers.

- Synthesis and functionalization of building blocks and biopolymers from renewable sources

- Processing technologies of polymeric and composite materials

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Chemistry and Energy

BIKE - BImetallic catalysts Knowledge-based development for Energy applications
Marie Skłodowska-Curie Action – International Training Network (MSCA-ITN)

https://www.bike-msca.eu/

BIKE is a network for training of **14 early stage researchers (ESRs)**, who will develop by an **innovative "holistic" approach**, the **next generation of bimetallic catalysts** for **blue and green hydrogen production**.

Basic Figures

Start date: 01 Apr 2019

End date 31 Mar 2023

9 Countries

10 Beneficiaries

7 Partner Organizations

14 ESRs hired by Jan 2020

Maximum Budget ≈ 3 .7M€

10 BENEFICIARIES

National Research Council of Italy

CSIC

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

KIT

Durham University

DTU

ICI CALDAIE

JM

7 PARTNERS ORGANIZATIONS

hydep

Universidad Zaragoza

TU/e

Università di Pisa

RMIT University

SIGMAEXPERIENCE

BIKE@SCITEC

Research:

- **Bimetallic catalysts for:**
  - **Steam Reforming of bio-metane / bio-gas**;
  - *Aqueous Phase Reforming*
  - *Anion Exchange Membrane Water Electrolysis*.

Coordinator: **vladimiro.dalsanto@scitec.cnr.it**

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the Marie Skłodowska-Curie Action – International Training Network (MSCA-ITN), grant agreement 813748.

Green Chemistry

Control, Mitigation, Prevention and Protection from Chemical Risk

EU Centres of Excellence - CBRN Project no. 65

Strengthening Chemical and Biological Waste management in Central Asia countries for improved security and safety risk mitigation

Afghanistan, Kyrgyzstan, Mongolia, Pakistan, Uzbekistan

- **Awareness-raising** and **dissemination activities** about **chemical risks** and **hazardous materials** held in research and educational institutions
- **Training and educational courses** on **safety and security** issues **in chemical laboratories**, small and medium **production sites**

Target agencies **Public Administrations; Ministries; Hospitals; Research Labs; Waste managements agencies in Asia and Europe**

Proposal for **Joint Training School** for **OPCW**

CNR-SCITEC - Ministry of Foreign Affairs - Federchimica

OPCW

Safety and Security from **Chemical Labs** to **Industrial Sites**

Addressed to **participants** of **developing countries**; **lectures, practical activities, site visits**

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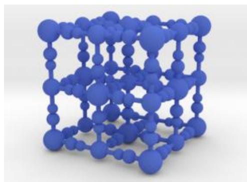
Green Chemistry

Advanced Solutions for Environmental Protection

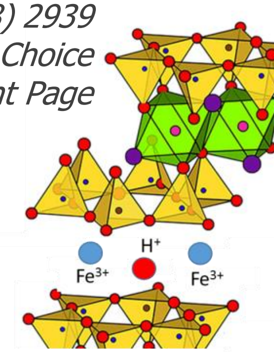
Nanostructured Materials based on **Prussian Blue** for the **decontamination** from **radioactive ^{137}Cs**

$K_4[Fe(CN)_6]\bullet 3H_2O$



Nanostructured bifunctional clays for the **adsorption** and **decontamination** of **chemical weapons**

Dalton Trans. 47 (2018) 2939
Editors' Choice with Cover Front Page



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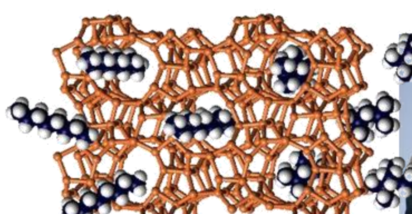
Italian Ministry of Agricultural, Food and Forestry Policies

Project "DIOL, DIfesa da organismi nocivi in OLivicoltura tradizionale e intensiva"

Defense from pests on conventional and intensive olive tree cultivation

mipaaf
ministero delle politiche agricole alimentari e forestali

The **olive fruit fly**, ***Bactrocera oleae*** is a major pest of olive tree cultivations in Italy and Mediterranean area

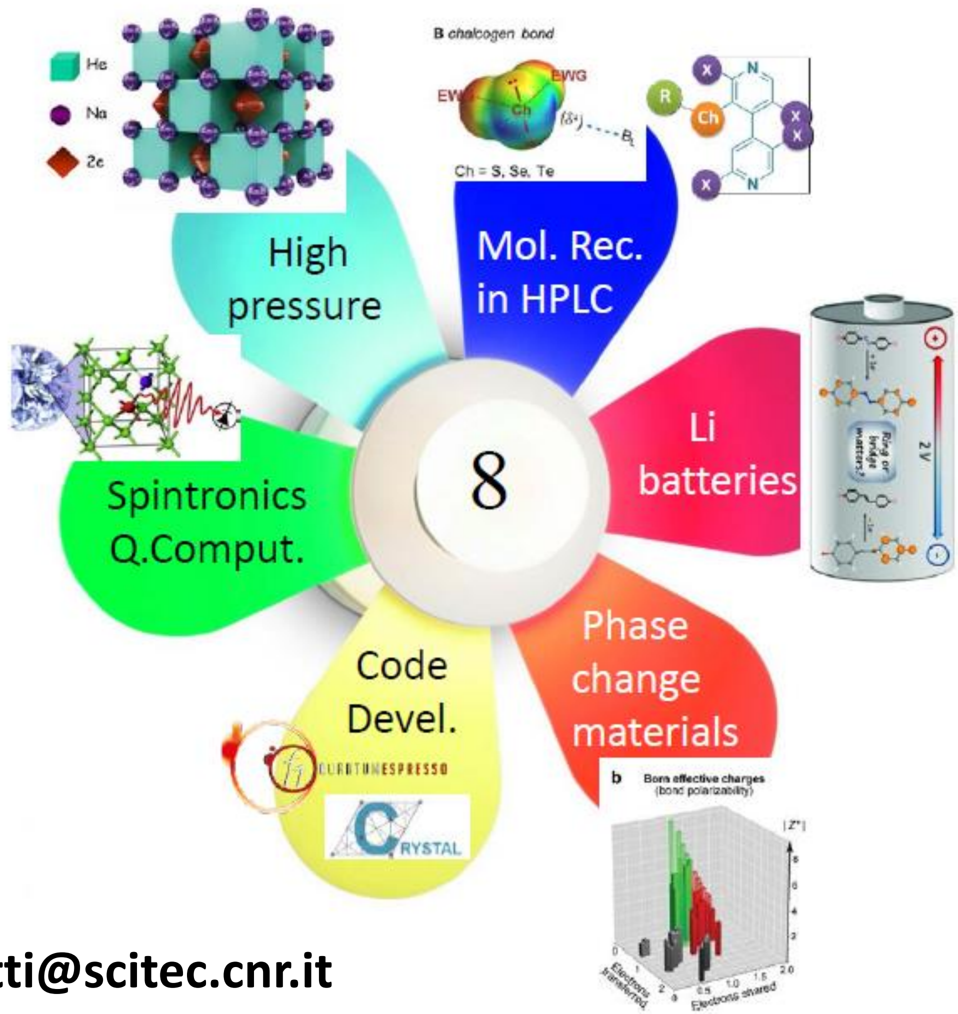


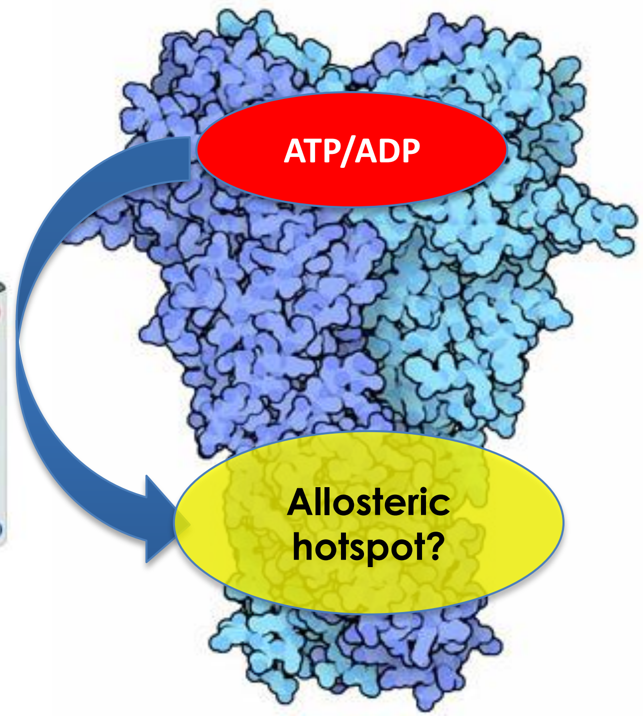
based on natural clays and zeolites

Design and development of **hybrid inorganic/organic materials** containing **bioactive principles for a controlled release**

→ up to 95% reduction of pest infestation

Computational Modeling





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g.colombo@unipv.it

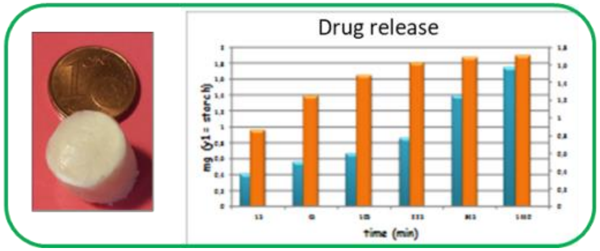
NMR for

Complex mixture analysis

Plant & Food wastes

Natural polymers for drug delivery

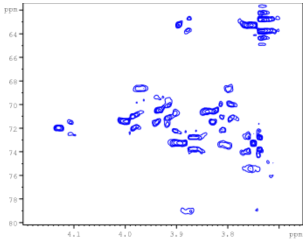
Starch from *Pisum S.*



Cryogels from modified starch

Cellulose & Guar gum

Polymers for the cosmetic industry: thickeners, conditioners, emulsifiers and film formers.



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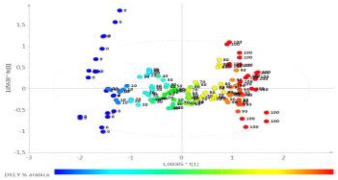
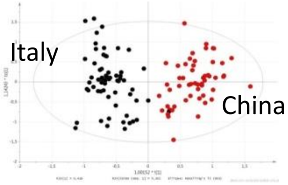
Agrofood Metabolomics

- Food Authentication
- Fraud Detection
- Geographical determination
- Shelf life
- Biactive molecules for life
- Agronomical practices
- Botanical origin
- Food quality
- Ripening stage
- Biomolecular markers



Roasted coffee



Tomato paste

Spectrometers: Bruker AVANCE **400**; Bruker AVANCE II **500**; Bruker AVANCE DRX **600**

NMR for

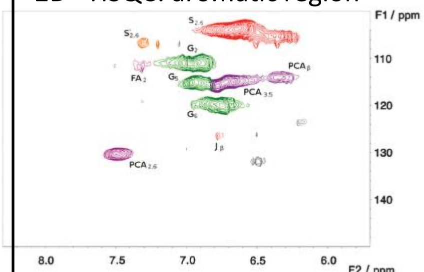
Single molecule/polymer analysis

Quantification

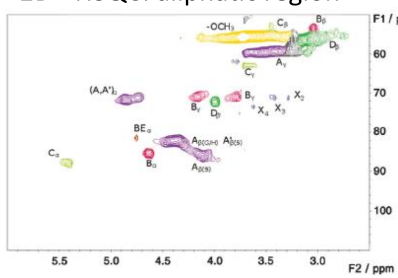
Organosolv treatm.

Biomass: Hemp hurds → → → Lignin

2D - HSQC: aromatic region



2D - HSQC: aliphatic region

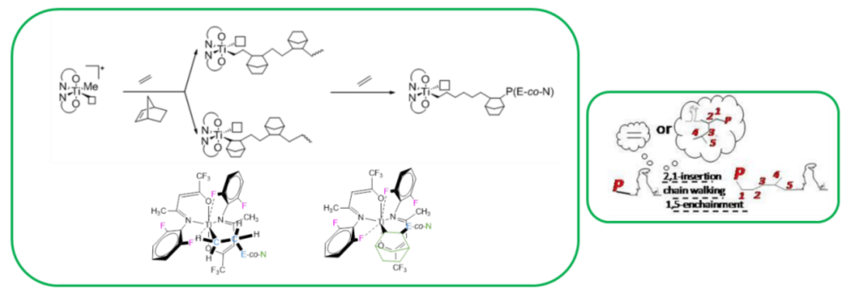


syringyl (S), guaiacyl (G), and phydroxyphenyl (H) units

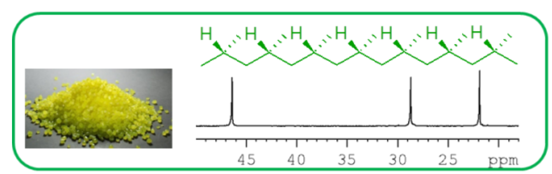
Side-chain regions as b-aryl ether (b-O-4) units (A and A'), pinoresinol (b–b) units (B), phenylcoumarane units (C), and spirodienone units (D). Other signals originating from methoxy groups (OMe), b-d-xylopyranoside units (X), and LCC linkages (BE)

Structural/microstructural characterization

Reaction Mechanism



Polymers microstructure



Advanced Materials

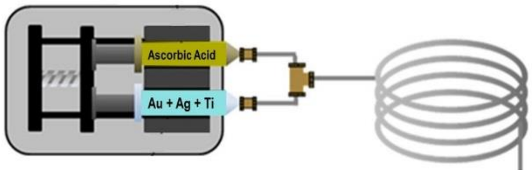
Nanotechnology laboratory

http://labcat.istm.cnr.it/

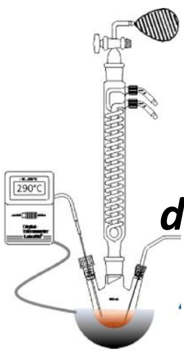
http://istemlab.istm.cnr.it/

Development of methodologies for the synthesis of nanomaterials

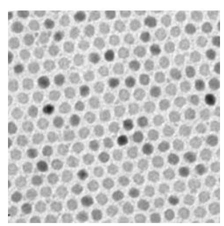
Metallic, oxidic and organic based



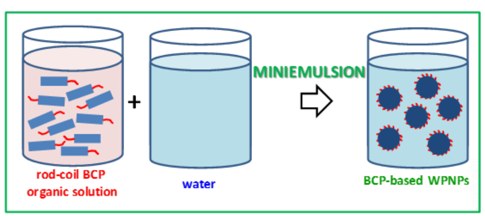
Flow reactions

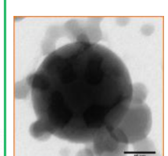


Thermal decomposition



Mini- and macro-emulsion

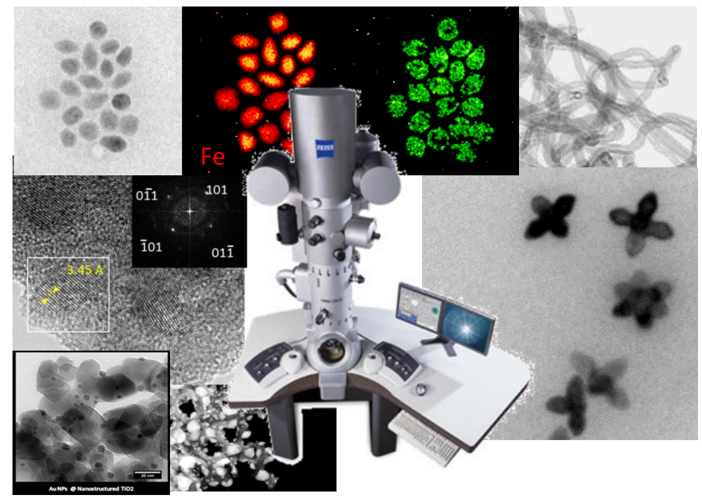




Applications

Biomedical, Catalytic, Microelectronic, Photovoltaic

Advanced Characterization



TEM 200kV Zeiss Libra200FE

equipped with second generation Omega filter, **EELS, EFTEM, STEM-HAADF, EDX**

DLS (Dynamic Light Scattering)

SQUID (Magnetometro)

Micro-FTIR (Microanalisi IR)

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