BioPhenom

About CNR

CNR is Italy's largest public research organization including 7 Departments and 88 Research Institutes across the country. The mission of the CNR Institute of Sciences and Technologies for Sustainable Energy and Mobility (STEMS) is to address the challenges of climate change mitigation, sustainable mobility development, and energy transition. To this aim, the CNR-STEMS acts along multidisciplinary research programmes and post-degree educational programmes through national and international collaborations with industries, academia, and research organizations.

The interdisciplinary research activities performed at the CNR-STEMS cover several research fields of national and international interest including the development of sustainable mobility systems, energy networks and their integration, power-to-gas technologies, Carbon Capture Use and Storage (CCUS) technologies, technologies for the production of clean energy carriers (hydrogen, methane, other gaseous and liquid carriers), distributed sensors and advanced data analytics methodologies in the management and optimization of energy systems. CNR-STEMS research also focuses on developing innovative materials, systems and strategies aimed at creating a sustainable circular economy that minimizes waste and maximizes resource efficiency. Attention is also devoted to the materials reusing, recycling and remanufacturing to extend their life cycle and reducing the environmental impact.

Consiglio Nazionale delle Ricerche

CNR RESEARCHERS

Donatella Duraccio, PhD

Researcher at CNR (STEMS, Torino, Italy)
Expert in the design, development, and characterization of polymers and complex multicomponent polymer systems.

Maria Elena Russo, PhD

Senior Researcher at CNR (STEMS, Napoli, Italy)
Expert in biochemical reaction engineering applied to biochemical depolymerization of lignocellulose, CO_2 capture and utilization.

Paola Brachi, PhD

Researcher at CNR (STEMS, Napoli, Italy),
Expert in thermochemical treatments of biomass and wastes via fluidized bed technology.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.
Grant Agreement No: 101135107

Project funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).
Grant Agreement No: 24.00212

UKRI Innovate UK

This work was supported by UKRI Horizon Europe Underwriting – Innovate UK Council [10005409].

BioPhenom

What will be the role of your organisation in the project?

CNR will provide a key contribution to BioPhenom being responsible for optimizing the operating conditions of feedstock pyrolysis at a lab-scale through in-situ catalysis made possible by the selection and preparation of catalysts with the purpose of maximising the bio-phenols yield. Also, CNR will be in charge to produce thermoplastic composites with flame retardant properties by combining bio-based PLA, biochar (solid residue from the fast pyrolysis) and functionalized bio-phenols. The final product properties will be studied and related to the different characteristics of the bio-chars and bio-flame retardants as well as to the composite composition. A thermoplastic composite demonstrator will be built and benchmarked against commercial thermoplastic products and recyclability of the demonstrator will be conducted to identify industrial opportunities.

How will the BioPhenom project make Europe more sustainable?

BioPhenom project will contribute to reducing the use of harmful substances in materials and formulations by developing a viable and optimized methodology to produce bio-based phenols from agro-industrial residues by using advanced technologies and processes such as fast pyrolysis and liquid extraction, thus increasing the sustainability of different industrial sectors in Europe.

What will be the main impact of the project?

CNR research efforts will provides outcomes with high impact on the exploitation and circular valorisation of lignin-rich side streams from several agricultural and industrial sectors. Indeed, the versatility of the fast pyrolysis process will be applied to the depolymerization of such raw materials through the tailored optimization of catalysts and operating conditions. Similarly, the incorporation of bio-intumescent flame retardants in PLA-based thermoplastic composites will replace melamine-based compounds commonly used for fire protection of insulation panels identified as SVHC due to melamine toxicity and irreversible contamination of aquatic ecosystems. Furthermore, with the production of PLA thermoplastics there will be the potentiality to replace PU and PS panels with important health considerations, as toxic isocyanates and styrene are used in the formulation of PU and PS.

Consiglio Nazionale delle Ricerche

CNR RESEARCHERS

Giovanna Ruoppolo, PhD
Executive Researcher at CNR (STEMS, Napoli, Italy)
Expert in heterogeneous catalysis and chemical reactor design for energy and fuel production by valorization of biomass and wastes.

Osvalda Senneca, PhD
Executive Researcher at CNR (STEMS, Napoli, Italy)
Expert in kinetics and reaction engineering of thermochemical conversion processes. Interests include pyrolysis of biomass and sold wastes.

Massimo Urciuolo, PhD
Researcher at CNR (STEMS, Napoli, Italy)
Expert in the fields of combustion, gasification and pyrolysis, environmental engineering and fluidized bed technology, for energy and material production from fossil and alternative solid fuels.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.
Grant Agreement No: 101135107

Project funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).
Grant Agreement No: 24.00212

UKRI Innovate UK

This work was supported by UKRI Horizon Europe Underwriting – Innovate UK Council [10005409].