Appendix 1

SCIENTIFIC, TECHNOLOGICAL AND SOCIAL METHODS ENABLING CIRCULAR ECONOMY information sheet

Department	INGEGNERIA INDUSTRIALE - DII
Coordinator	Prof. Manuele Dabalà
Number of positions	30
SCHOLARSHIP funded by MD 351/2022 ***See Appendix***	SCHOLARSHIP N. 1 – Università degli Studi di Padova – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Valorization of agri-food by-products by the sustainable production of polyhydroxyalkanoates (PHA) and green biofuels in the frame of the circular economy" SCHOLARSHIP N. 2 – Università degli Studi di Padova – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Sustainable production of bioplastics" SCHOLARSHIP N. 3 – Università degli Studi di Bologna – **Curriculum:** Technical Materials for Circularity; **Topic**: "Chemical processes for the recovery of critical raw materials" SCHOLARSHIP N. 4 – Università degli Studi di Brescia – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic**: "Ecological transition in the automotive sector" SCHOLARSHIP N. 5 – Università degli Studi di Cagliari – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Integrated bio-electrochemical and biological processes for effective circular use of residues and bioproducts" SCHOLARSHIP N. 6 – Università degli Studi di Firenze – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic**: "Interdisciplinary Circular and Nature-based solutions (I CAN)" SCHOLARSHIP N. 7 – Università degli Studi di Firenze – **Curriculum:** Technical Materials for Circularity; **Topic**: "End of life and innovative circular uses in the renewable energy field" SCHOLARSHIP N. 8 – Università degli Studi di Messina – **Curriculum:** Technical Materials for Circularity; **Topic**: "Catalytic technologies to close the carbon cycle" SCHOLARSHIP N. 9 – Università degli Studi di Milano – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Improving the circularity of biodegradable bioplastics" SCHOLARSHIP N. 10 – Università degli Studi di Milano – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Pale Green Crops for a Sustainable Agriculture and a More Efficient Production of Renewable Energy" SCHOLARSHIP N. 11 – Università degli Studi di Milano "Bicocca" – **Curriculum:** Technical Materials for Circularity; **Topic**: "Cigarette butts upgrading for the production of electro-catalytic materials per the hydrogen production technology" SCHOLARSHIP N. 12 – Università degli Studi di Milano "Bicocca" – **Curriculum:** Circular Biomaterials and Biorefinery;

	Topic: "Biorefinery for safe-by-design nanomaterials" SCHOLARSHIP N. 13 – Università degli Studi di Napoli "Parthenope" – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic**: "EU Law and Circular Economy" SCHOLARSHIP N. 14 – Università degli Studi di Palermo – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Thermocatalytic decarbonization and valorization of residual organic matrixes in Zinc based molten salts" SCHOLARSHIP N. 15 – Università degli Studi di Roma "La Sapienza" – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Experimental investigation of biological CO_2 conversion to valuable organic components in waste biorefinery" SCHOLARSHIP N. 16 – Università degli Studi di Salerno – **Curriculum:** Technical Materials for Circularity; **Topic**: "Development of new depolymerizable composite and elastomeric polymeric materials based on lactide and other bio-renewable cyclic esters" SCHOLARSHIP N. 17 – Scuola Superiore S. Anna – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic**: "Circular Economy and Industrial Symbiosis in a Life Cycle perspective" SCHOLARSHIP N. 18 – Università degli Studi di Torino – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Manipulation of stress conditions and responses in tomato (Solanum lycopersicum L.) to increase the extraction yield of secondary bio-based compounds" SCHOLARSHIP N. 19 – Politecnico di Torino – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic**: "Green innovations to achieve net zero CO_2 emissions: biofuels, negative carbon projects and carbon credits" SCHOLARSHIP N. 20 – Università degli Studi di Trento – **Curriculum:** Technical Materials for Circularity; **Topic**: "Enabling circular economy by Additive Manufacturing methods for metallic tools repair" SCHOLARSHIP N. 21 – Università degli Studi di Venezia "Ca' Foscari" – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic**: "Advanced materials for environmental applications"
SCHOLARSHIP funded by DM 352/2022 ***See Appendix***	SCHOLARSHIP N. 22 – Università degli Studi di Padova – **Curriculum:** Technical Materials for Circularity; **Topic:** "Chemical and sustainable approaches for the recovery and recycling of copper from waste" **Co-finanziata da:** MANICA S.p.A.; SCHOLARSHIP N. 23 – Università degli Studi del Piemonte Orientale "A. Avogadro" – **Curriculum:** Technical Materials for Circularity; **Topic:** "Assessment and reduction of the environmental impact of civil and industrial waste by innovative treatment, separation, recovery and degradation processes" **Co-finanziata da:** Marazzato Servizi Ambientali Srl;
SCHOLARSHIP FUNDED BY	SCHOLARSHIP N. 24 – Fondazione Edmund Mach – **Curriculum:** Circular Biomaterials and Biorefinery;

UNIVERSITY/OTHER BODIES ***See Appendix***	**Topic:** "Sustainable use of herbs waste in the diet of dairy cows for improvement of milk quality and reduction of carbon footprint" SCHOLARSHIP N. 25 – Fondazione Edmund Mach – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic:** "LCA applied to agriculture and agro-food processing chains in a mountain territory" SCHOLARSHIP N. 26 – Università degli Studi di Bari "A. Moro" – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic:** "Circular chemistry for safe and sustainable by design materials and processes" SCHOLARSHIP N. 27 – Università degli Studi della Basilicata – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic:** "LCA for the evaluation of different closed-loop systems of organic waste valorisation" SCHOLARSHIP N. 28 – Università degli Studi di Camerino – **Curriculum:** Technical Materials for Circularity; **Topic:** "Methodologies for regenerative design at architectural and urban scales" SCHOLARSHIP N. 29 – Università degli Studi Politecnica delle Marche – **Curriculum:** Circular Anthropogenic Environment and Society; **Topic:** "Investigating the impacts of EU Taxonomy on financial markets" SCHOLARSHIP N. 30 – Università degli Studi di Perugia – **Curriculum:** Circular Biomaterials and Biorefinery; **Topic:** "Setting up better suited varieties by harnessing plant reproduction"		
Selection criteria	PRESELECTION ON THE BASIS OF EVALUATION OF QUALIFICATIONS AND ORAL EXAMINATION		
Oral examination via remote interview:	Applicants who have requested it in the application form will take the oral exam via remote interview using the ZOOM videoconference tool.		
Evaluation criteria	Qualifications: points max 60 Oral examination: points max 40 Candidates may apply for admission to more than one Topic, with a maximum limit of 3 topics. The project proposal will be unique for all submitted applications.		
Documents to be submitted	**Curriculum:**	Points: max 54	- Candidate Profile: 1) Relevance of your profile with respect to the Curriculum indicated and with respect to a specific research topic ("Tema Vincolato") selected; 2) Extended summary of the master's / specialist / old system degree thesis. For candidates who have not yet obtained the master's degree (or equivalent), the summary must be countersigned by the supervisor; 3) Proposal for a research project pertaining to the specific topic for the three-year period of the doctorate. The project proposal must be prepared according to the "PhD project proposal" model available at the link https://www.unipd.it/dottorato/scientific-technological-social-methods-enabling-circular-economy (max punti 21). - Candidate career: Grade Point Average weighted by the number of credits for exams taken in the

			Laurea Triennale (max 10 points) + Magistrale/Specialistica (max 8 points) or arithmetic average for exams taken in the Laurea Vecchio Ordinamento (max 18 point). For students with a foreign degree, provide the Grade Point Average (GPA) for each degree obtained (max score 18). - Actual length of your studies (max 12 points); - Other titles: 1) Time spent abroad during your studies (e.g. Erasmus grants, Time, Erasmus Placement, thesis abroad, etc.); 2) Relevant work experience after graduation (research grants, scholarships, internship periods, period of employment); 3) Scientific awards relevant to the curriculum; 4) Other qualifications (e.g., teaching assistantships). (Max 3 points)
	Scientific publications:	Points max 3	Scientific publications: publications in journals/conferences proceedings/books and patents; report full bibliographical information (name of authors, journal or conference name, volume, publication year, pages, DOI). Manuscripts accepted for publication will be considered only if DOI is provided. (max score 4). WARNING: insert publication data in the "LIST OF QUALIFICATIONS" template available at: https://www.unipd.it/dottorato/scientific-technological-social-methods-enabling-circular-economy
	Reference Letter:	Point max 3	Reference letter written through the PICA web form by a faculty member or a person working in industry.
Preselection: First meeting of the Evaluating Commission	**24 agosto 2022** alle ore 09:00		
Publication of the results of the evaluation of the preselection	Within 30 AUGUST 2022 the evaluating Commission will publish the results of the evaluation of the qualifications in the following website: **https://www.unipd.it/dottorato/scientific-technological-social-methods-enabling-circular-economy**		
Publication of the timetable of remote interviews and instructions on how to use the ZOOM video conferencing	By 30 AUGUST 2022 the commission will publish on the course website **https://www.unipd.it/dottorato/scientific-technological-social-methods-enabling-circular-economy** the timetable of the remote interviews and the instructions on how to use the ZOOM video conferencing for those applicants who have chosen in the application form to take the oral examination via remote interview and who have passed the preselection on the basis of the qualifications with a pass-mark of at least 7/10.		
Oral examination	06/09/2022 ore 09:00 - The exam may continue: 07/09/2022 ore 9:00, 08/09/2022 ore 9:00 – 09/09/2022 ore 9.00 videoconferenza ZOOM		

APPENDIX

SCHOLARSHIP N. 1

D.M. 351/2022 Action Line: PNRR

Topic: "Valorization of agri-food by-products by the sustainable production of polyhydroxyalkanoates (PHA) and green biofuels in the frame of the circular economy"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Marina Basaglia
e-mail: marina.basaglia@unipd.it

Hosting University/Research Centre: Università degli Studi di Padova, Italy

Department:
Department of Agronomy, Food, Natural resources, Animals and Environment
Via dell'Università 16, 35020 Legnaro (PD) - Italy
https://www.dafnae.unipd.it/en/

Description:
Agri-food residues, including lignocellulosic biomasses and winemaking by-products (WB), are heterogeneous, underutilized, recalcitrant to degradation, and potentially polluting.
However, they are rich in substances useful for various industrial applications. With a multidisciplinary approach, we propose an in-depth characterization of the residual biomasses, selected for their high availability in the national context such as WB, the identification of valuable substances, and the development of extraction and purification technologies with green methods.
In a biorefinery context, the microbial conversion of these residues into bioproducts such as biogas, bioethanol, and, in particular, polyhydroxyalkanoates (PHA) will be evaluated. The production of biomolecules will be demonstrated using both cyanobacteria, autotrophic bacteria that use sunlight as an energy source, and heterotrophic microbial strains, suitably developed through innovative techniques of genetic engineering and microbial ecology.

SCHOLARSHIP N. 2

D.M. 351/2022 Action Line: PNRR

Topic: "Sustainable production of bioplastics"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Tomas Morosinotto
e-mail: tomas.morosinotto@unipd.it

Hosting University/Research Centre: Università degli Studi di Padova, Italy

Department:
Department of Biology
Viale G. Colombo 3, 35131 Padova - Italy
https://www.biologia.unipd.it/en/

Description:
The goal is to develop innovative and flexible biotechnological processes for the sustainable exploitation of CO_2-rich emissions, converting them into:
a) clean biofuels
b) high value-added chemical components, such as polyhydroxyalkanoates (PHA) for the production of bioplastics or building-block molecules interesting for the pharmaceutical or the food industry.
The production of PHA or other high value-added CO_2 molecules from waste will be demonstrated using cyanobacteria, organisms that then use sunlight as an energy source, maximizing the sustainability of the process.

SCHOLARSHIP N. 3

D.M. 351/2022 Action Line: PNRR

Topic: “Chemical processes for the recovery of critical raw materials”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Fabrizio Passarini
e-mail: fabrizio.passarini@unibo.it

Hosting University/Research Centre: Alma Mater Studiorum - Università degli Studi di Bologna, Italy

Department:
Department of Industrial Chemistry "Toso Montanari"
Viale del Risorgimento 4, 40136 Bologna - Italy
https://chimica-industriale.unibo.it/

Description:
This project aims at developing a recycling process for strategic metals from urban and industrial wastes. Metals, in particular transition metals and the rare earth elements (REEs), are fundamental for the transition to a greener society.
They have a key role in all of those technologies (e.g., permanent magnets, rechargeable batteries, catalysts, catalytic converters, superconductors etc.) that are involved in decarbonization, the reduction of energy consumption and the cutting of emissions.
The global demand for these strategical raw materials is increasing dramatically in recent years. In Europe, there are not enough primary sources to satisfy the demand and in some cases like the REEs and the PGMs (Platinum Group Metals) mine extraction is almost negligible. So, it has become of great importance to find new sources of metals like secondary (recycled) sources.
One of the biggest issues with metal recycling are the relatively small concentrations in the waste streams that make the recycling process not technologically feasible and economically expensive in many cases.

SCHOLARSHIP N. 4

D.M. 351/2022 Action Line: PNRR

Topic: "Ecological transition in the automotive sector"

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Federica Gasbarro
e-mail: federica.gasbarro@unibs.it

Hosting University/Research Centre: Università degli Studi di Brescia, Italy

Department:
Department of Economy and Management
Contrada Santa Chiara, 50, 25122 Brescia - Italy
https://www.unibs.it/en/node/57

Description:
Decarbonizing transportation is a top global priority for mitigating climate change. A strong political commitment to decarbonization has emerged in Europe. The EU has set a binding target of achieving climate neutrality by 2050 and of cutting emissions by at least 55% by 2030.
Therefore, the EU is working on the revision of its climate, energy and transport-related legislation.
Phasing out of the combustion engine will require a transformation of the entire automotive industry.
There will be impacts on the automotive firms and indirect effects on supply chains and logistic systems.
Such low-carbon transition is a complex process envisaging the interplay of different strategies (e.g. introducing cleaner vehicles; sharing mobility; mobility as a service).
How traditional car manufacturers and original equipment manufacturers respond to coercive, normative and mimetic pressures towards carbon reduction targets will shape the transition to net-zero emissions at the industry level.
The project aims to investigate the ecological transition in the automotive sector from a business and management point of view.

SCHOLARSHIP N. 5

D.M. 351/2022 Action Line: PNRR

Topic: "Integrated bio-electrochemical and biological processes for effective circular use of residues and bioproducts"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Michele Mascia
e-mail: michele.mascia@unica.it

Hosting University/Research Centre: Università degli Studi di Cagliari, Italy

Department:
Department of Mechanical, Chemical and Materials Engineering
Via Marengo 2, 09123 Cagliari - Italy
https://www.unica.it/unica/en/dip_ingmeccanica.page

Description:
The waste biorefinery concept shifts the paradigm from fossil to renewable biological sources, as the proper combination of processes of different nature can maximize the recovery of resources from organic matrices which, managed in the traditional way, represent cost elements and potential sources of environmental impacts.
Among the possible combinations, the one that involves biochemical and electrochemical processes is one of the most interesting.
Biochemical degradation processes can hydrolyze and simplify the complex organic substance, giving rise to compounds that can be directly exploited or further processed to obtain also high-value products.
Bio-electrochemical processes can work on the outflows of biochemical processes or be coupled to these to enhance their performance or expand the range of recoverable products.
The project aims to investigate process schemes suitable to yield bio-based chemicals, energy carriers and bioproducts.

SCHOLARSHIP N. 6

D.M. 351/2022 Action Line: PNRR

Topic: "Interdisciplinary Circular and Nature-based solutions (I CAN)"

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Federico Preti
e-mail: federico.preti@unifi.it

Hosting University/Research Centre: Università degli Studi di Firenze, Italy

Department:
Department of Agriculture, Food, Environment and Forestry
Piazzale delle Cascine 18, 50144 Firenze - Italy
https://www.dagri.unifi.it/index.html?newlang=eng

Description:
Development of Standards for:
- hydrogeological risk mitigation with locally available or recovered materials (Life Cycle Sustainability Assessment of green vs grey vs combined interventions; risk assessment for insurance);
- water-sediment-waste value-chain integration in circular economy, identification of governance models, optimal scale and smart technologies;
- impact analysis of the production (or procurement) and disposal (if any) of the materials (chemical, physical and industrial components).

SCHOLARSHIP N. 7

D.M. 351/2022 Action Line: PNRR

Topic: “End of life and innovative circular uses in the renewable energy field”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Gianpaolo Manfrida
e-mail: giuseppe.manfrida@unifi.it

Hosting University/Research Centre: Università degli Studi di Firenze, Italy

Department:
Department of Industrial Engineering
Viale Morgagni 40, 50134 Firenze - Italy
https://www.dief.unifi.it/

Description:
The topic of this PhD proposal will address the End of Life of different RES technologies of specific interest for Italy (geothermal, solar, wind, biomass, hydro), and the possibility of developing circular uses for resources (steel, aluminum, glass, copper, plastics, rare materials, use of water and land,…) and waste streams (carbon dioxide, recovery of heat/cold/minerals/chemicals).
The scientific approach will be through LCA, Sustainability LCA and exergo-ecological costing.

SCHOLARSHIP N. 8

D.M. 351/2022 Action Line: Public Administration

Topic: “Catalytic technologies to close the carbon cycle”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Siglinda Perathoner
e-mail: siglinda.perathon@unime.it

Hosting University/Research Centre: Università degli Studi di Messina, Italy

Department:
Department of Chemical, Biological, Pharmaceutical and Environmental Sciences
Via Stagno d'Alcontres, 98166 Messina - Italy
https://www.unime.it/it/dipartimenti/chibiofaram

Description:
The thesis has the objective to develop novel catalytic technologies to close the carbon cycle, particularly in energy intensive industries.
Closing the carbon cycle and enabling a carbon circular economy in energy-intensive industries (iron and steel, cement, refineries, petrochemistry and fertilizers) are topics of increasing interest to meet the demaning target of defossilizing the production.
The focus is on CO_2 reuse technologies in this context. In particular, the aim is to pass from the current multistep technologies, where the use of a sequence of operations having different requirements and operative conditions determines an inefficient and costly process, to technologies where all the processes can be realized in a single step.
The activities planned for the PhD student relate to the development of dundamental knowledge for the demonstration of the feasibility (proof of the concept - PoC) of the technology.
They will therefore focus on the following aspects: i) synthesism characterization and evaluation of the electrods and electrocatalysts for the selective reduction of CO_2, ii) development of regenerable $Ni(OH)_2$ supported anodes that act as redox storage devices, and allow improvement in the efficiency and rate of the CO_2 reduction process, iii) development of mebranes to be able to operate the devices in the presence of diluted CO_2 emissions, iv) development of a device for the PoC of the technology and preliminary assessment in terms of cost and emissions of CO_2 compared to multistep production.

SCHOLARSHIP N. 9

D.M. 351/2022 Action Line: PNRR

Topic: "Improving the circularity of biodegradable bioplastics"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Fabrizio Adani
e-mail: fabrizio.adani@unimi.it

Hosting University/Research Centre: Università degli Studi di Milano, Italy

Department:
Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy
Via Celoria 2, 20133 Milano - Italy
https://www.unimi.it/en/ugov/ou-structure/department-agricultural-and-environmental-sciences-production-landscape-agroenergy

Description:
Today, bioplastics certified as biodegradable and compostable are collected within biowaste and thus, their disposal follows waste management strategies used for organic wastes.
Composting represents a good approach in degrading bioplastics, limiting their leakage into the environment and solving the plastics issue.
Nevertheless, because it requires energy to be performed, it contributes positively to greenhouse gas emissions.
Because of this fact and in the light of the application of Circular Economy rules, new strategies for treating bioplastics, recovering material and energy, appear mandatory and useful to be investigated.

SCHOLARSHIP N. 10

D.M. 351/2022 Action Line: PNRR

Topic: "Pale Green Crops for a Sustainable Agriculture and a More Efficient Production of Renewable Energy"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Paolo Pesaresi
e-mail: paolo.pesaresi@unimi.it

Hosting University/Research Centre: Università degli Studi di Milano, Italy

Department:
Department of Biosciences
Via Celoria 26, 20133 Milano - Italy
https://www.unimi.it/en/ugov/ou-structure/department-biosciences

Description:
There is a need for a ground-breaking technology that enables a low input, sustainable agriculture.
This challenge will be addressed by investigating the use of pale green, high albedo, barley mutants, characterized by an improved water use efficiency and a reduced need of nitrogen for their cultivation, to increase the efficiency of bifacial Agriphotovoltaic plants.
More into details, the three-year project has the objective to characterize two barley pale-green mutants through:
1. the identification of mutated genes involved in the control of leaf pigment content;
2. the evaluation of their performance, i.e. resource use efficiency, yield and photovoltaic light conversion efficiency, under the Agriphotovoltaic cultivation conditions.
The expected results will lead to the definition of a new generation of pale green crops that can increase the albedo of cultivated areas without any deleterious effect on yield, while maximizing the use of resources and the efficiency of the Agriphotovoltaic technology.

SCHOLARSHIP N. 11

D.M. 351/2022 Action Line: PNRR

Topic: "Cigarette butts upgrading for the production of electro-catalytic materials per the hydrogen production technology"

Curriculum: Technical Materials or Circularity

Contacts:
Prof. Carlo Santoro
e-mail: carlo.santoro@unimib.it

Hosting University/Research Centre: Università degli Studi di Milano – Bicocca, Italy

Department:
Department of Materials Science
Via Roberto Cozzi 55, 20125 Milano - Italy
https://www.mater.unimib.it/en

Description:
The project would be aimed at upgrading cigarette butts by enhancing the cellulose acetate of the filter and producing char, which is, then also transformed into electrocatalysts for the hydrogen production technology. Cigarette butts are currently not in any recycling chain.

SCHOLARSHIP N. 12

D.M. 351/2022 Action Line: PNRR

Topic: "Biorefinery for safe-by-design nanomaterials"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Paride Mantecca
e-mail: paride.mantecca@unimib.it

Hosting University/Research Centre: Università degli Studi di Milano – Bicocca, Italy

Department:
Department of Earth and Environmental Sciences
Piazza della Scienza 1 and 4, 20126 Milano - Italy
https://www.disat.unimib.it/en

Description:
Oleaginous microorganisms enable the production, from agro-industrial residual biomasses, of microbial oils of different compositions depending on the microorganism, the biomass used and the culture conditions.
The laboratory has in the past successfully produced microbial oil that have found applications
in the tyre world as plasticizers or in animal feed. In this project, different formulations of microbial oils with different percentages of mono- and polyunsaturated fatty acids (including components such as long chain omega 3 fatty acids) will be produced in bioreactor, optimizing fermentation performances and subsequent extraction.
The efficacy and safety of the newly developed lipids, as well as their specific biological activity will be evaluated in lab using the model organism zebrafish (Danio rerio).
The environmental sustainability of the production processes will be addressed by Life Cycle Assessment (LCA) methodology.

SCHOLARSHIP N. 13

D.M. 351/2022 Action Line: PNRR

Topic: "EU Law and Circular Economy"

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Cristina Schepisi
e-mail: cristina.schepisi@uniparthenope.it

Hosting University/Research Centre: Università degli Studi di Napoli "Parthenope", Italy

Department:
Department of Economy and Law
Via Amm. F. Acton, 38 - 80133 Napoli - Italy
https://www.uniparthenope.it/ugov/organizationunit/243

Description:
On 30 March 2022, the European Commission proposed a package of legislative measures as part of the European Green Deal (EGD) (previously announced in the Circular Economy Action Plan (CEAP).
The project aims at analysing the impact of the new EU legislation on the internal market and the role of Member States, undertakings and individuals.
A basic knowledge of the general EU legal framework is crucial to understand the evolution of the legislative process and to evaluate the issues stemming from the application of the new rules on Circular Economy (CE).
A new concept of industry is going to rise through - among others - a massive reduction of pollution and the adoption of renewable energy in line with the green transition provided under the Next generation EU and detailed by National recovery and resilience plans. In this sense the project will combine institutional profiles (EU competences in environmental, energy and industrial policies; new models of governance in the context of CE) with those related to the internal market (like the impact on free movement of goods, services, consumers protection). Special attention will be reserved on the impact of EGD on EU competition law where the new legislations on CE will bring new elements for the traditional definition of markets, for the evaluation of distribution systems or agreements between undertakings to invest in R&D to reach the green goals. Part of the project will also refer to the new policy on State aids where the Commission Guidelines on climate, energy and environment offer a key perspective of the role that Member States may play for the effective creation of a circular economy model in EU.

SCHOLARSHIP N. 14

D.M. 351/2022 Action Line: PNRR

Topic: “Thermocatalytic decarbonization and valorization of residual organic matrixes in Zinc based molten salts”

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Alessandro Galia
e-mail: alessandro.galia@unipa.it

Hosting University/Research Centre: Università degli Studi di Palermo, Italy

Department:
Department of Engineering
Viale delle Scienze, Ed. 8, 90128 Palermo - Italy
https://www.unipa.it/dipartimenti/ingegneria/en/index.html

Description:
The ultimate goal of the project is providing proof-of-concept of the thermo-catalytic valorisation of residual organic wastes using zinc based molten salts to

i) recover the energy content of the matrix by producing a low-carbon H_2-rich fuel gas and
ii) sequestrate the majority of the carbon content into a solid product suitable for further applications (e.g., biochar, nanocarbons, fertilizer, etc.) depending on its characteristics.

SCHOLARSHIP N. 15

D.M. 351/2022 Action Line: Public Administration

Topic: "Experimental investigation of biological CO_2 conversion to valuable organic components in waste biorefinery"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Alessandra Polettini
e-mail: alessandra.polettini@uniroma1.it

Hosting University/Research Centre: Università degli Studi di Roma "La Sapienza", Italy

Department:
Department of Civil, Constructional and Environmental Engineering
Via Eudossiana 18, 00184 Roma - Italy
https://www.dicea.uniroma1.it/en/

Description:
The aim of the project is to investigate one of the possible stages of a waste biorefinery, where the CO_2 generated from the biological treatment of biodegradable organic residues is further processed to be converted to a range of organic molecules through chain elongation reactions.
Various process alternatives for the biological conversion of CO_2 into more complex, high-value, organic species will be experimentally investigated.
Residual biomass from waste/wastewater treatment will be used as a source of microorganisms to support the biological reactions.
The potential beneficial effect of combining CO_2 with other products and by-products of the biorefinery treatment units (H2, acetate, ethanol, …) and the integration of biological and electrochemical processes will also be the focus of the research.
An integrated approach typical of process and environmental engineering will be required to conduct the research.

SCHOLARSHIP N. 16

D.M. 351/2022 Action Line: PNRR

Topic: “Development of new depolymerizable composite and elastomeric polymeric materials based on lactide and other bio-renewable cyclic esters”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Claudio Pellecchia
e-mail: cpellecchia@unisa.it

Hosting University/Research Centre: Università degli Studi di Salerno, Italy

Department:
Department of Chemistry and Biology
Via Giovanni Paolo II 132, 84084 Fisciano - Salerno - Italy
https://www.dcb.unisa.it/en

Description:
The project aims at the development of thermosetting resins that can be subjected at the end of their life to "chemical" recycling, that is to a depolymerization process that leads to the recovery of the starting monomers.
The proposed approach involves the synthesis of crosslinkable resins by means of bonds capable of cleaving in the presence of a suitable catalyst.
A similar approach could be used to design degradable cross-linked elastomers, suitably modulating the structure of the resin and of the cross-linking agent.
A further possibility is to develop new thermoplastic elastomers through the synthesis of ABA-type degradable copolymers (similar but alternative to those of the SBS type) where A is a "hard" crystalline block or in any case with a high Tg and B is a "soft" block amorphous and low Tg.
In particular, both "hard" and "soft" blocks could be based on easily depolymerizable aliphatic polyesters.

SCHOLARSHIP N. 17

D.M. 351/2022 Action Line: Public Administration

Topic: "Circular Economy and Industrial Symbiosis in a Life Cycle perspective"

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Marco Frey
e-mail: marco.frey@santannapisa.it

Hosting University/Research Centre: Scuola Superiore S. Anna – Pisa, Italy

Department:
Institute of Management
Piazza Martiri della Libertà 33, 56127, Pisa - Italy
https://www.santannapisa.it/en/institute/management

Description:
A circular transition requires a growing contribution from businesses which have to move beyond own organization boundaries and embrace a life cycle perspective by strengthening strategic collaboration with actors of the value chain.
The research project should explore internal and inter-organizational dynamics which support the adoption of circular economy practices as well as industrial symbiosis actions.
A further focus should be on detecting how collaborations within and among organizations as well as how policy makers and consumers may stimulate, also by means of a life cycle logic, innovative and creative solutions in terms of new circular products.

SCHOLARSHIP N. 18

D.M. 351/2022 Action Line: PNRR

Topic: "Manipulation of stress conditions and responses in tomato (Solanum lycopersicum L.) to increase the extraction yield of secondary bio-based compounds"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Andrea Schubert
e-mail: andrea.schubert@unito.it

Hosting University/Research Centre: Università degli Studi di Torino, Italy

Department:
Department of Agricultural, Forest and Food Sciences
Largo Paolo Braccini 2, 10095 Grugliasco, TO - Italy
https://en.disafa.unito.it/do/home.pl

Description:
Aim of the project is to optimize a circular cascading approach to valorise residual biomass from tomato commercial cultivation (shoots, roots and non-marketable fruit), replacing wasting/burning with cascading for the extraction of high-value compounds — with a non-exclusive focus on alkaloids.
The project will explore the effects of climate change-related stresses on the metabolic profile of tomato plants.
Both the metabolites and the transcriptional profile of the biosynthetic pathways will be assessed.
This will allow to develop novel uses for the stressed residual biomass, replacing wasting or burning with cascading for the extraction of high-value compounds. Additionally, bio-based micropeptides will be tested as elicitors of alkaloids and more in general, characterised as mediators of mitigation/acclimation responses to different abiotic stresses.
Biotechnological approaches based on the plant's own metabolic responses to stress will be explored, both for proof-of-concept of basic findings, and as tools for increased metabolite production via treatment with micropeptides, or gene editing/overexpression.

SCHOLARSHIP N. 19

D.M. 351/2022 Action Line: PNRR

Topic: "Green innovations to achieve net zero CO_2 emissions: biofuels, negative carbon projects and carbon credits"

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Carlo Cambini
e-mail: carlo.cambini@polito.it

Hosting University/Research Centre: Politecnico di Torino, Italy

Department:
Department of Management and Production Engineering
Corso Duca degli Abruzzi 24, 10129 Torino - Italy
https://www.digep.polito.it/en

Description:
The project aims at analysing the economic dimensions of greenhouse gas emissions' reduction and sequestration potential offered by innovations in biofuels and negative carbon technologies such as biochar. The research will assess the effectiveness of existing standards and develop new methodologies for the accounting of carbon credits.
While this market is still in its infancy, demand is rising rapidly and the process of certifying emission offsets from innovative technologies is not clearly defined.
Governments and companies are highly interested in this application to achieve their decarbonization commitments, but for now the reporting of emission reductions through this pathway remains ambiguous.
The project will combine the exploration of market potential and key actors for the development of new green solutions with policy insights on certification and transparent mechanisms to regulate these growing markets.

SCHOLARSHIP N. 20

D.M. 351/2022 Action Line: PNRR

Topic: “Enabling circular economy by Additive Manufacturing methods for metallic tools repair”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Massimo Pellizzari
e-mail: massimo.pellizzari@unitn.it

Hosting University/Research Centre: Università degli Studi di Trento, Italy

Department:
Department of Industrial Engineering
Via Sommarive 9, Povo, 38123 TN - Italy
https://webapps.unitn.it/du/en/StrutturaAccademica/STO0008625/Persone

Description:
Repairing of metal parts, by means of additive manufacturing (AM), take on particular importance for complex and high-value components, whose replacement would be expensive in terms of both part cost and line shutdown. However, the literature lacks information about the quantification of the cradle-to-grave environmental benefits of repair-based manufacturing approaches.
The very limited number of papers available highlights high potential savings of raw materials, energy, and pollution. However, improved exploitation of repairing enabling circular economy will rely on important technical aspects like the best repairing technology for a given form of damage, the optimum repairing strategy, the selection of suitable materials, processing parameters, finishing operations, and post-heat treatment.
Most case studies reported in literature rarely consider the general frame, proposing solutions that are lacking and poorly applicable in practice.
Part of them do not consider the environmental and economic impacts, at all.
Aim of this project is to approach the repairing of tools and dies using a global approach.

SCHOLARSHIP N. 21

D.M. 351/2022 Action Line: PNRR

Topic: “Advanced materials for environmental applications”

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Alberto Vomiero
e-mail: alberto.vomiero@unive.it

Hosting University/Research Centre: Università degli Studi di Venezia “Ca’ Foscari”, Italy

Department:
Department of Molecular Sciences and Nanosystems
Via Torino 155, 30170 Venezia Mestre - Italy
https://www.unive.it/dep.dsmn

Description:
The project focuses on the end-of-life valorization of biobased- and bio-materials, of agro-food waste and of biobased-products or on the closure of the cycle for end-of-life materials and products of anthropogenic origin such as plastics, construction materials, composites, etc.
The PhD candidate will study chemical and engineering solutions for the recovery-reuse-recycle of agro-food waste or of waste materials of anthropogenic origin towards the synthesis of advanced functional materials and functional biobased molecules to be applied in several different sectors that span from packaging, wellness, pharma, medical, energy and environmental remediation.
Potential applications may include (but are not limited to): solar energy conversion and solar fuels, batteries, hydrogen production, CO_2 capture and reduction, production of high-value chemicals, novel bioplastics and biofilms, water purification, valorization of agro-industrial wastes and others.
All the scientific aspects of the new materials will be considered, from structure, to functionality, including material modeling, aiming at tuning and controlling the functional properties according to the requirements of the final application.

SCHOLARSHIP N. 22

D.M. 352/2022
Co-financed by: MANICA S.p.A.

Topic: “Chemical and sustainable approces for the recovery and recycling of coppper from waste”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Silvia Gross
e-mail: silvia.gross@unipd.it

Hosting University/Research Centre: Università degli Studi di Padova, Italy

Department:
Department of Chemical Sciences
Via Marzolo 1, 35131 Padova - Italy
https://www.chimica.unipd.it/en/

Description:
The Ph.D project will concern the development of a new and sustainable process for the synthesis of copper salts (e.g. copper sulphate), starting from metallic copper, for agriculture purposes.
The focus will be on the possibility of using copper from wastes as raw material: within this framework, also the recovery of other metals (e.g. Ni, Fe, Mn, Cd, Zn), which are present as impurities, will be evaluated in a circular economy perspective.
Waste copper sources are, for example, cables, home appliance’s components, exhausted print circuit cardboards, and fishing nets.
During the project will be considered the upscalability of the copper leaching process, also its sustainability in terms of water consumption and energy efficiency; the overall safety by avoiding the use of aggressive reagents, and the LCA of the final product.
Characterization of the synthesized compound will be performed, such as UV-Vis, IR and Raman spectroscopy, X-ray techniques, thermogravimetric analysis.

SCHOLARSHIP N. 23

D.M. 352/2022
Co-financed by: Marazzato Servizi Ambientali Srl

Topic: "Assessment and reduction of the environmental impact of civil and industrial waste by innovative treatment, separation, recovery and degradation processes"

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Enrico Boccaleri
e-mail: enrico.boccaleri@uniupo.it

Hosting University/Research Centre: Università degli Studi del Piemonte Orientale "A. Avogadro", Italy

Department:
Department for Sustainable Development and Ecological Transition
Piazza Sant'Eusebio 5, 13100 Vercelli- Italy
https://disste.uniupo.it/ /

Description:
The project intends to study strategies to identify, analyse and treat industrial and civil wastes with novel energy-efficient and environmentally-friendly processes.
The aim is scouting and developing methodologies based on separation, sequestration, degradation and treatment methods able to: i) minimize the impact of critical and emerging pollutants, ii) reduce landfilling, iii) promote end-of-waste valorization and circular economy.
The project must consider the development of innovative methods on a laboratory scale and the possibilities of integration of research on a pilot scale up to the scale-up of processes in the industrial context, with the aim of i.e. matching the needs of carbon-and energy-intensive processes needs, assessing innovative strategies using gasification methods, identifying and developing highly absorbent materials from sustainable feedstocks for hard-to-abate specific organic and inorganic pollutants present in civil and industrial streams.
The activity will be located in Vercelli, in collaboration with the company "Marazzato Servizi Ambientali"

SCHOLARSHIP N. 24

Scholarship Funded by Fondazione Edmund Mach

Topic: "Sustainable use of herbs waste in the diet of dairy cows for improvement of milk quality and reduction of carbon footprint"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Dr. Elena Franciosi
e-mail: elena.franciosi@fmach.it

Hosting University/Research Centre: Fondazione Edmund Mach, Italy

Department:
Research and Innovation Centre
Via Edmund Mach 1, 38098 San Michele all'Adige TN - Italy
https://cri.fmach.it/en/

Description:
Huge amounts of biowaste materials are produced from industries, such as cosmetic and essential oils industries during the extraction of the bioactive compounds.
This waste need proper methods of valorisation in the circular bioeconomy model for their sustainable uses to reduce their environmental burdens.
Many different plant bioactive compounds have been explored to manipulate ruminal microbial feed fermentation and lower methane emissions without affecting production performances of ruminants because of their antimicrobial properties.
With this project we want to use industrial herbs waste to improve ruminal fermentation and milk production, decrease methane production in dairy cattle, and subsequently reduce carbon footprint of milk production.
Therefore, we want to study the effect of industrial herbs waste on ruminal fermentation in vitro and milk production performance, methane production and health of dairy cows.
Finally, the outcomes of this project will also contribute to establish initiative for green, clean and viable environment for a healthy society.

SCHOLARSHIP N. 25

Scholarship Funded by Fondazione Edmund Mach

Topic: "LCA applied to agriculture and agro-food processing chains in a mountain territory"

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Dr. Silvia Silvestri
e-mail: silvia.silvestri@fmach.it

Hosting University/Research Centre: Fondazione Edmund Mach, Italy

Department:
Research and Innovation Centre
Via Edmund Mach 1, 38098 San Michele all'Adige TN - Italy
https://cri.fmach.it/en/

Description:
The concept of "Measurement of the processing cycles sustainability" is well present in all the strategies for sustainable development recently launched by the EC and those approved at national and local level.
The project is aimed at create within Fondazione Edmund Mach advanced competences on the Life Cycle Assessment (LCA) methodology in order to apply it in an operational way, to support experimental activities and local stakeholders in the implementation of sustainable action plans.
The assessment of the environmental impacts caused by the agri-food processing chains located in mountain regions needs the development of tailor - made approachs, based on the sharing of available data-base and the implementation of new data collected on site.
The use of LCA tool based on recognized international standards is one of the possible pathways to define the best compromise in terms of sustainability along the full producing chain.

SCHOLARSHIP N. 26

Scholarship funded by University

Topic: “Circular chemistry for safe and sustainable by design materials and processes”

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Maria Lucia Curri
e-mail: marialucia.curri@uniba.it

Hosting University/Research Centre: Università degli Studi di Bari “A. Moro”, Italy

Department:
Department of Chemistry
Via Orabona 4, 70126 Bari - Italy
https://w3.uniba.it/ricerca/dipartimenti/chimica/en/home

Description:
The paradigm shift towards a circular economy requires the integration of safety and sustainability in the development of new materials and processes.
Safe and Sustainable by Design (SSBD) principles integrate the safety, circularity and functionality of advanced materials, products and processes throughout their life cycle.
For the development of innovative materials, SSBD includes identifying suitable starting materials, possibly bio-based alternatives to substances of concern and modifying them in order to achieve optimal properties and functionality in the specific application.
These concepts match the principles of circular chemistry that aims at producing safer and more sustainable materials by means of more efficient processes, using non-hazardous and renewable raw materials, reagents and solvents and moving away from the use and dispose principle. At the same time valorisation of bio-based and waste product can be also developed.
The deployment of these strategies can turns in processes and materials that can find applications in a variety of fields, encompassing the development of environmentally friendly catalysts for the synthesis of sustainable products by means of alternative synthetic strategies, the manufacture of complex hybrid smart materials able to perform a variety of functions for application in healthcare, food and agriculture.

SCHOLARSHIP N. 27

Scholarship funded by University

Topic: “LCA for the evaluation of different closed-loop systems of organic waste valorisation”

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Donatella Caniani
e-mail: donatella.caniani@unibas.it

Hosting University/Research Centre: Università degli Studi della Basilicata, Italy

Department:
School of Engineering
Via dell'Ateneo Lucano, 85100 Potenza - Italy
https://ingegneria.unibas.it/site/home.html#

Description:
In the framework of the activities of the DeCost project, the PhD project is aimed at an accurate environmental assessment for the new waste management model must be carried out.
LCA will be the used tool following the guidance provided in the Product Environmental Footprint Guide.
Different waste management closed-loop systems of organic waste valorisation, integrating decentralised home and community composting systems with urban agriculture, for instance, will be compared by applying a LCA approach.

SCHOLARSHIP N. 28

SCHOLARSHIP di Ateneo

Topic: “Methodologies for regenerative design at architectural and urban scales”

Curriculum: Technical Materials for Circularity

Contacts:
Prof. Federica Ottone
e-mail: mariafederica.ottone@unicam.it

Hosting University/Research Centre: Università degli Studi di Camerino, Italy

Department:
School of Architecture and Design
Viale della Rimembranza, 63100 Ascoli Piceno - Italy
https://saad.unicam.it/en

Description:
Developing a planning-design methodology that aims to identify new possibilities to orienting the transformation process of the built environment toward a circular process that harnesses the potential of using and transforming of the waste materials-sourced from different sectors-or natural-based materials (NBS) with zero impact.
In this framework, it is intended to work in two possible directions, placing side by side the "cradle to cradle®" concept, regarding a continuous cycle of reuse of materials or components, with that of "upcycling" linked to the qualities of the project to be developed: physical-performance qualities, qualities in terms of the possibility of reuse (design for disassembly), environmental qualities to reduce the effects of climate change, and symbolic and aesthetic qualities.
The development of a parametric design methodology, based on the principle of impact prediction, is based on the redefinition of categories and indicators useful for optimizing and balancing different options and tying processes to different environmental, social and economic contexts.

SCHOLARSHIP N. 29

Scholarship funded by the University

Topic: “Investigating the impacts of EU Taxonomy on financial markets”

Curriculum: Circular Anthropogenic Environment and Society

Contacts:
Prof. Caterina Lucarelli
e-mail: c.lucarelli@univpm.it

Hosting University/Research Centre: Università degli Studi Politecnica delle Marche, Italy

Department:
Department of Management
Piazzale Martelli 8, 60121 Ancona - Italy
https://www.dm.univpm.it/

Description:
The European Commission published in 2019 the EU Taxonomy on Sustainable Finance.
With a disruptive nature, completely new in this landscape, it represents a combination of a consolidation and indirect approach to regulation. In fact, on the one hand, the EU Taxonomy consolidates existing sector-specific environmental regulations, introducing strict technical criteria to establish to what extent company's activities are environmentally sustainable.
On the other hand, the EU Taxonomy follows an indirect approach that introduces sustainability-linked transparency requirements for financial market participants offering sustainable financial products. In other words, “finance” (offer side of capital markets) can be claimed “sustainable” only if capital flows are directed towards companies (demand side) in line with sector-specific environmental regulations recalled in the EU Taxonomy.
The EU Taxonomy is therefore expected to put pressure on companies to pursue corporate investment strategies aimed at improving their sustainability profile in order to avoid missing out funding opportunities.
The aim of the project is to investigate the impacts of the EU Taxonomy on the capital markets, considering both the offer and the demand of financial capital.

SCHOLARSHIP N. 30

Scholarship funded by the University

Topic: “Setting up better suited varieties by harnessing plant reproduction”

Curriculum: Circular Biomaterials and Biorefinery

Contacts:
Prof. Emidio Albertini
e-mail: emidio.albertini@unipg.it

Hosting University/Research Centre: Università degli Studi di Perugia, Italy

Department:
Department of Agricultural, Food and Environmental Sciences
Borgo XX Giugno 74, 06121 Perugia - Italy
http://dsa3.unipg.it/en/

Description:
Apomixis is an alternative way to sexual reproduction that some plants use to produce viable seeds containing genetic clones of the female parent.
Although it is regarded as a promising tool for breeders and farmers, apomixis does not occur in most food crops.
The conversion of a sexual reproducing genotype to one that reproduces by apomixis would make it possible to fix the genotype of a plant variety selected for a particular environment or market niche, whereby the clonally reproduced seeds could be continuously and inexpensively produced, independent of pollination or pollinator.
Harnessing the important potential of apomixis will help in win the challenge of a growing population facing pressures due to climate change and strong societal demands on health and biodiversity preservation.
Moreover, apomixis could allow the development of varieties with increased primary and by-products, reduced waste and better suited for energy production in a circular economy point of view.