POLITECNICO DI MILANO

PhD in CHIMICA INDUSTRIALE E INGEGNERIA CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 38th cycle

PNRR_352 Research Field: PLASTICS CHEMICAL RECYCLE

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Plastics have characteristics that explain their interest - strength and durability - but they also pose a risk when end-of-life is poorly managed. They also consume non-renewable fossil resources. These two factors justify the need for better recycling. And that's where the problem lies. Only 32.5% of plastic was recycled in 2019. Responding to the challenge, Europe has adopted an ambitious strategy to achieve a 60% plastic recycling rate by 2025.One of the reasons that plastic in its daily applications has become a threat to our environment is the serious lack of recycling technologies, which could allow the production of high-quality polymeric material from waste, at the same or lower cost than the creation of the virgin version from oil sources. The project proposed here has the ambitious goal of solving the problems due to the accumulation of plastic waste with low technical and commercial value by using a fast and flexible upcycle process to obtain materials with a higher value, in particularly by proposing a completely innovative, efficient, economical and environmentally compatible process prototype for their recycling. Because the poor mechanical properties of the polymers mechanically recycled, the attention today is devoted to the chemical recycle whose goal is to obtain a polymer that must be indistinguishable from the virgin one. This project is dedicated in particular to the chemical recycle of

	undifferentiated plastic through a process based on pyrolysis with the aim to obtain useful feedstocks to be sent to a polymerization plant. The technology will be analyzed at pilot plant scale with the aim of a possible industrial plant in the coming years.
Methods and techniques that will be developed and used to carry out the research	The PhD formation will be based all on the application of chemical engineering methodologies to the advancement of plastics chemical recycling. The starting engineering culture of the PhD candidate will be completed with all the chemical culture related to plastic chemical recycling applied to a process design. The LCA concept in particular will be also exploited in order to validate the sustainability of the developed processes from the point of view of the environmental impact and of the economic sustainability. The approach to be followed will be the training on job, that conjugates experimental and modeling activities.A2A will be responsible for the training on job in an industrial R&D facility, to be acquainted on the assessment on the technical and economic feasibility of a future industrial plant
Educational objectives	To form a PhD able to drive the polymer recycling industry into the new environmental goals avoiding all the misleading green washing claims. Moreover, PhD will be trained in an industrial environment on a project of industrial interest, where he/she will join engineering and management cultures.
Job opportunities	In EU about 200.000 new jobs are expected to be created in the field of plastic recycling, that needs high skilled chemical process engineers embedding the concepts of the process industry with those of the circular economy. A full employment is registered so far for the PhD graduates from Politecnico di Milano
Composition of the research group	5 Full Professors 5 Associated Professors 4 Assistant Professors 17 PhD Students
Name of the research directors	Prof. M. Masi Prof. F. Manenti

Contacts
maurizio.masi@polimi.it 02 23993131 - 3334349324 flavio.manenti@polimi.it 02 23993273 https://.cfalab.chem.polimi.ithttps://super.chem.polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	A2A - Corso di Porta Vittoria 4, Milano www.a2a.eu A2A S.p.A. is an Italian multiservice company, listed on the Milan Stock Exchange, which operates in the sectors of environment, energy, heat, networks and technologies for smart cities. It is active in the production, distribution and sale of electricity (second in Italy for installed capacity), gas, waste management, environmental services and the development of products and services for energy efficiency, the circular ec
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Universitat Polytecnica de Catalunya - Pl. Eusebi Güell, 6. 08034 Barcelona, Spain - https://www.upc.edu/en This university has a specific knowledge about research and teaching about the LCA analysis of complex chemical processes at industrial scale
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Confidentiality: since this is a thematic scholarship, the management of Confidential Information, Results and their publication is subordinate to the restrictions agreed upon with the funding company. Upon acceptance of the scholarship, the beneficiary must sign a specific commitment.

Individual budget for research (during the 3 years): about 5.400 euro

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial of for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation.


POLITECNICO
MILANO