



PhD in INGEGNERIA DEI MATERIALI / MATERIALS ENGINEERING - 38th cycle

**THEMATIC Research Field: EFFECT OF MORPHOLOGICAL-STRUCTURAL
CHARACTERISTICS AND RECYCLATE CONTENT ON THE FRACTURE TOUGHNESS OF
POLYETHYLENES**

Monthly net income of PhDscholarship (max 36 months)
€ 1325.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<p>Motivation and objectives of the research in this field</p>	<p>Morpho-structural parameters such as the type of comonomer play an important role, on the Environmental Stress Cracking (ESC) strength of polyethylenes. Their effect can be explored following a Fracture Mechanics (FM) approach. In particular, an FM-based analysis provides much richer information than the single data returned by conventional ESC tests, being able to generate curves whose various parameters (e.g. the critical interaction time t^* or the slope of the resistance-time curves) can be evaluated and more easily correlated with the general mechanical behaviour and physical-mechanical models available in the literature.</p> <p>FM also provides an ideal approach to evaluate another aspect of great interest, namely the influence on the fracture properties of the recycled material content that can be added to the polymer with a view to increasing the sustainability of these materials. Instead of proceeding empirically, it is possible to study the effect that the addition of a certain content of recycled material has on the different properties, thus optimising the final composition according to the applications of interest.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>Details on the proposed FM approach can be found here:https://www.cmic.polimi.it/media/3812/fracture.pdf</p> <p>The research is sponsored by Versalis S.p.A. It will be</p>



	carried out at Politecnico di Milano and partially in the laboratories of Versalis R&D division in Mantova (Italy).
Educational objectives	The PhD candidate will become familiar with state-of-the-art fracture testing protocols and analysis, using existing models and developing new ones to correlate the fracture resistance with materials structure as determined by its synthesis and transformation processes on the way to realize industrial products.
Job opportunities	The PhD candidate will develop an in-depth knowledge of mechanical testing methods and lifetime prediction tools, together with a variety of advanced morpho-structural analysis techniques used in the polymer field. This will make her/him a valuable asset to any material producer/end-user also working with materials widely differing from polyethylene.
Composition of the research group	1 Full Professors 3 Associated Professors 3 Assistant Professors 5 PhD Students
Name of the research directors	Prof. Luca Andena

Contacts

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<https://www.cmic.polimi.it/ricerca/elenco-gruppi-di-ricerca/polyenglab/>

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	662.5 €
By number of months	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 support 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.