



**Research Doctorate (Ph.D.) in Chemical Sciences
32nd Cycle – Academic Year 2016/2017**

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Project Information

1 - Title

Solving the conflict between strength and toughness in heterophasic polypropylene through design of reactor blends.

2 - Key words

Heterophasic copolymers, Isotactic Polypropylene, Toughness, Mechanical Strength, Spheripol process.

3 - Abstract

The aim of the project is the study of heterophasic copolymers based on polypropylene to reconcile strength and toughness in a same polymeric material and develop novel heterophasic copolymers (HECO) as structural materials with improved impact resistance and high strength. High impact HECOs are reactor blends in which isotactic polypropylene (iPP) is toughened by effect of the fine dispersion of soft components, consisting generally of an ethylene/propylene copolymers. Although this toughening-approach may result in commercial HECOs with tailored toughness used in widespread applications, the control of their strength is still a challenge. In this project, the mechanisms controlling strength and toughness of HECOs will be investigated. To this aim the compositional heterogeneity of HECOs will be elucidated and their structure, morphology thermal and mechanical properties and those of the corresponding components will be compared with those of model mixtures of HECO components, and/or metallocene-made copolymers. The final goal will be of identifying the molecular rules for overcoming the conflict of strength vs. toughness, to obtain materials with tailored levels of damage tolerance, for specific applications.