POLITECNICO DI MILANO

PhD in CHIMICA INDUSTRIALE E INGEGNERIA CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 37th cycle

THEMATIC Research Field: POLYMERIZATION TECHNOLOGIES FOR FLUORINATED POLYMERS

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	
Motivation and objectives of the research in this field	The main focus of this project will be the modeling of heterogeneous polymerization processes of different fluorinated homo- and co-polymers using a novel technology preventing the use of conventional fluorinated emulsifiers. The model development will be also the opportunity to elucidate the main reaction mechanisms, with emphasis on particle formation.
Methods and techniques that will be developed and used to carry out the research	The research, financed and conducted in collaboration with Solvay Specialty Polymers, aims at developing a kinetic model for the polymerization of fluorinated monomers avoiding the use of fluorinated surfactants, which are more and more strictly regulated by national and international authorities. The new model will include a comprehensive kinetic scheme accounting for propagation, termination and branching reactions. Different recipes will be handled, considering variations of temperature and pressure, combinations of nucleating and transfer agents, and different initiating systems. The model will be supported by experiments, performed by the industrial partner. Product characterizations will involve the evaluation of: - Polymer conversion, particle size distribution, zeta potential, concentration of ionic species and solution ionic strength; - Average molecular weights of the polymer soluble

	fraction (Mn, Mw), polymer gel fraction (%w), extent of short chain branching; - Water and polymer phase composition (amount and type of low molecular weight species)
Educational objectives	The student will develop strong competencies in the field of polymer reaction engineering, combining both experimental and modeling work. Working in collaboration with Solvay will provide a unique opportunity for experiencing an industrially-driven applied research.
Job opportunities	PhD graduates in the field of polymer reaction engineering can develop their professional careers in manifold contexts, from multinational polymer industries to more specialized companies. The combination of modeling and laboratory experience allows the candidates to be versatile and particularly suitable for R&D sectors.
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 15 PhD Students
Name of the research directors	Proff. G Storti / M. Sponchioni / D. Moscatelli

Contacts
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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	564.01 €
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.

Educational activities (funding for participation in courses, summer schools, workshops and conferences) - financial aid per PhD student per year:
1st year: -
2nd year: about 1.500 euros per student
3rd year: about 1.500 euros per student

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.