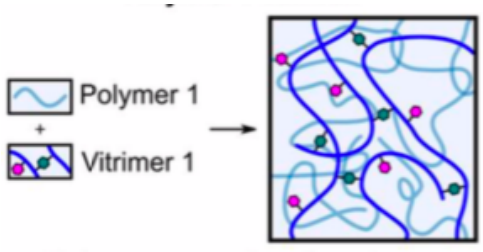
PhD position

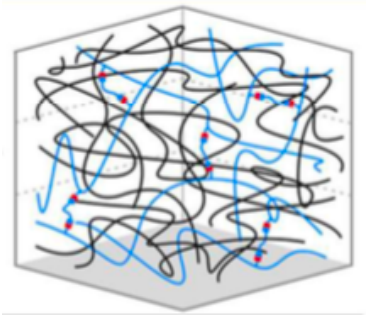
Modelling vitrimer dispersion and its influence on nonlinear rheology

Department of Chemical, Materials, and Production Engineering, Federico II University, Naples, Italy;
Bio and Soft Matter, IMCN, Université catholique de Louvain, Louvain-La-Neuve, Belgium.

This 4-year PhD project is part of the European Doctoral Network 'ReBond' (www.rebondproject.eu), which involves eight Universities, five industrial partners and 15 PhD students. By combining the expertise of the different partners in synthesis, advanced characterization, linear and nonlinear dynamics, mechanical properties, modelling, and plastic product development and processing, we shall uncover the underpinning relationships among processing and performance of vitrimer-based recycled plastics and elastomers.

Vitrimeric polymers consist of dynamic covalent networks, which can change their topology by thermally activated bond-exchange reactions. At high temperature, they flow like viscoelastic liquids, while at low temperature they behave like classical thermoset polymers.





In the framework of 'ReBond', the first objective of this PhD is the investigation, based on theoretical models, of the dispersion of vitrimers within a homopolymer matrix as function of the crosslink density and vitrimer concentration. Then we aim at extending this study to polymer blends composed of linear chains of two different chemistries. The research activity will also focus on the nonlinear rheology of vitrimeric systems, to be validated against experimental data.

The PhD degree will be a double degree, jointly issued by the University of Naples (Italy) and the Université catholique de Louvain (Belgium). The research activity will be carried out in strong collaboration also with the University of Leeds (UK), one of the ReBond partners.

Due to EU mobility rules, the candidate must not have spent more than 12 months in Italy in the last 3 years.

The applicant must have a Master's degree in engineering, materials science or physics, with a capability in mathematical or computational analysis. Additionally, good knowledge of soft matter with emphasis on polymer physics is helpful and will be seriously considered (but not essential).

Applications should be sent by email (a single pdf file containing a detailed CV, a transcript of marks obtained during the Master, a motivation letter, and the names of two referees) to: rebond-manager@uclouvain.be

Salary/month: net salary is about 2.8k€ + family allowance (about 600€, if applicable).

Starting date: preferably between January and April 2024, certainly not later than September 1st 2024.

Project duration: 24 months in Naples, and 24 months in Louvain-La-Neuve, including a long stay (8 months) in Leeds.