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ESR-8 JOB VACANCY

Position description

Reference:	ESR-8		
Title:	Theory and modeling of structural and mechanical relaxation in vitrimer materials		
Hiring beneficiary:	TU/e		
Location:	Groene Loper 5, 5612 AE Eindhoven The Netherlands.		
Start date:	01 October 2020	Duration:	36+12 months
Expected date of communication of results:	Less than 2 months after the application submission		

Job description

Objective:	Development of theoretical and computational models accounting for the structural and mechanical behaviour of vitrimers featuring different exchange mechanisms based on experimental results gathered from the different partners of the consortium. The main focus lies on elucidating the link between structure, microscopic relaxation dynamics, and (bulk) mechanical properties for given exchange mechanisms.
Expected results:	Two theoretical approaches will be combined for the first time in vitrimers. ESR will develop and apply a general first-principles mode-coupling theory to describe the structural relaxation and topology freezing transition in vitrimers and quantify the role of structural properties (connectivity, orientational distribution, composition) that relate to mechanical performance. ESR will also develop multiscale simulations and analytical frameworks to analyze (i) the molecular-scale dynamics of exchange reactions, and how they affect stress relaxation (ii) the mesoscale rearrangement of network topology facilitated by exchange reactions and (iii) the bulk dynamical-mechanical response (G' and G'' as a function of frequency) of complex vitrimer systems, both after initial loading and repeated cycling. This will lead to new theoretical models able to predict and understand the properties (exchange rates, stress relaxations, mechanics) of the broad diversity of vitrimer systems available within the consortium. The models will be constantly refined, optimized and validated through data gathering of experimental knowledge that ESR8 will acquire during the secondments at chemists and industrial partners.
Supervisors:	Prof. C. Storm Dr. L. Janssen Dr. W.G. Ellenbroek

Secondments (short term academic and industrial internships):

S1-S3 to **UCBL** (Lyon, France, 1 month) – **Polymat** (San Sebastian, Spain, 1 month) – **UGent** (Ghent, Belgium, 1 month) chemist partners to catalogue experimental specifications and peculiar mechanisms of the different vitrimer technologies developed within the consortium, as well as gathering data for model refinement and experimental validation based on rheological, thermomechanical and viscoelastic results. All materials to be used as input for development of consensus validation and characterization protocols, based on linear and nonlinear rheology and yielding tests.

S4 to **Covestro** (Leverkusen, Germany) – 3 months – Determination of the network topology by means of dielectrical and rheological methods to develop/adapt models to PU elastomers with realistic network topology.

Vacancy requirements

Qualifications:

Not having resided in the Netherlands for more than **12 months in the 3 years** immediately before the recruitment date, and **not having carried out their main activity** (work, studies, etc.) in the Netherlands during this period.

Having a master degree or equivalent diploma, less than 4 years of research career at the recruitment date, and not having a doctoral degree.
Solid background in theoretical physics or theoretical chemistry, particularly statistical mechanics and soft matter science. Familiarity with computational approaches (molecular dynamics, Monte Carlo methods, machine learning) is a plus.

Languages:

Good level in oral and written English is mandatory.
Dutch language is optional. Courses will be offered through the doctorate school.

Skills:

Ability to work autonomously, solid project management skills, ability to disseminate results in written and oral, formal and informal communication with colleagues and supervisors and strong teamwork spirit.

Experience:

Having completed a research internship in academia or industry.

Job details

Gross salary:

Salary and benefits will be in compliance with the rules of the ITN-MSCA, as foreseen in the Marie Skłodowska-Curie Actions Work Programme, and in accordance with the Collective Labour Agreement of the Dutch Universities, increasing from € 2,325 per month initially, to € 2,972 in the fourth year

Other benefits:

Gross family allowance: 350 € per month - if applicable at the time of recruitment
(estimated net family allowance before income tax: 280 €/month)
Family allowance: 'Family' means persons linked to the researcher by marriage (or a relationship with equivalent status to a marriage recognised by the legislation of the country where this relationship was formalised) or dependent children who are actually being maintained by the researcher.

An attractive package of fringe benefits, including end-of-year bonus (8,3% in December), an extra holiday allowance (8% in May), moving expenses and excellent sports facilities.

Duration:	36 months within the VITRIMAT project TU/e will provide 12 months additional salary to comply with Dutch PhD regulations.
Starting date:	Ideally ca. the 01/10/2020
Type of contract:	Full time position
Hours per week	38 hours
Place of work:	Theory of Polymers and Soft Matter group, Department of Applied Physics. Eindhoven University of Technology (www.tue.nl/en) Groene Loper 19 5612AP Eindhoven, the Netherlands.
Local language:	Dutch

Application package is available on the Recruitment page of the VITRIMAT website
<https://www.vitrimat.eu/Recruitment.html>