

## **2 PhD Fellowships (tandem) in Marie Skłodowska-Curie Innovative Training Network on Thiol-ene Miniemulsion Photopolymerisation**

**PhD training topic:** 3D printing of porous polyesters by thiol/ene polymerizations of high internal phase emulsions with hierarchical topology for tissue engineering applications

**PRESENTATION:** We invite highly motivated and creative applicants for 2 PhD positions within a collaborative project between the PolyOrgLab (UNI Maribor, Slovenia) and the Institute of Applied Synthetic Chemistry (TU Vienna, Austria). The PhD candidates will work in tandem and be part of the innovative training network (ITN) "Towards Next generation Eco-efficient PHOTO and EMULSION Polymerizations" funded through the Horizon 2020 Marie Skłodowska-Curie Actions Programme. PHOTO-EMULSION focuses on new eco-friendly chemical processes for the manufacturing of plastic products. The project aims at training a group of 8 PhD students through a high-quality research network including 8 internationally reputed academic institutions, 4 leading companies and 2 non-profit organisations. Balanced and European-wide, the project's diversity expresses through the participation of 8 different countries: Austria, France, Germany, Ireland, Poland, Slovenia, Sweden & Spain.

**PhD PROJECTS:** The two research projects focus on an efficient method for producing highly porous polymers with cellular interconnected macroporous structure (Fig. 1). At TU Vienna new bifunctional and polyfunctional thiols and monomers (in particular based on renewable resources) will be synthesized to open the door for novel eco-friendly decorative coatings. At PolyOrgLab a templating method is adapted, where droplets of an emulsion are used to induce macro pores in the polymer bulk while the monomers are included in the continuous phase. State of the art thiol/ene click reaction<sup>[1]</sup> will be used within the continuous phase in order to tune both the morphology and mechanical properties of the formed polymer networks since these are important characteristics of the material which are governing the biological cell growth and proliferation. Since the emulsion is highly concentrated, typically the volume fraction of the droplet phase exceeds 70%, the polymer film produced by photopolymerization, exhibits pores on multiple levels. Furthermore, the emulsion templating method is combined with additive manufacturing technology and with sintered bead templating method, in order to obtain polymers with an added level of macro porosity facilitating biological cell growth and proliferation. Feedback from cell biology labs will be used to optimize the morphology and mechanical properties and to design the hierarchical structure specifically for the desired type of cells and tissue generation. Furthermore, these novel materials could find application as 3D-printed chromatography columns. Each PhD project includes 26 months in the main host institution (UNI Maribor or TU Vienna), a 6-month secondment at the academic partner premises (UNI Maribor or TU Vienna), and a 4-month secondment at an industrial partner (Glantreo, Ireland).

**ELIGIBILITY:** At the time of recruitment, the candidate must not have resided or carried out their main activity (work, studies, etc.) in the country of their recruiting organisation for more than 12 months in the 3 years immediately prior to start of the project. Short stays such as holidays are not taken into account.

### **Specific Requirements for Employment:**

TU Wien: Master in Chemistry with focus on synthetic organic and macromolecular chemistry. Your field of study is Synthetic Chemistry, and you have experience with polymerization (preferably radical and cationic) and the synthesis of monomers and initiators.

PolyOrgLab at UNI Maribor: Master in Chemistry. Specialization in organic synthetic chemistry is preferred.

**GENERAL CANDIDATE REQUIREMENTS:** Candidates can be of any nationality, but are required to undertake transnational mobility. Candidates should ideally possess a Master's degree in chemistry, material science or a closely related discipline. Candidates must be within the first four years of his/her research career. Applications from candidates who already possess a doctoral degree will not be considered. Potential candidates should be able to demonstrate motivation and a strong eagerness to learn. Individuals must possess excellent written, oral communication in English and organizational skills. In addition, they should demonstrate the ability both to work independently and as part of a team. Previous related research experience will be a distinct advantage. Scientific curiosity with an open attitude to work interdisciplinary in the framework of international collaborations is also essential. All students must be willing to travel. The ideal starting date would be September 1<sup>st</sup>, 2018.

**FUNDING:** PhD positions are funded at the level stipulated by Marie Skłodowska-Curie Actions funding rules with stipends starting at €45,000 per year (pre-tax, full time 40 hours / week, for 36 months) for the Vienna position and €39,000 for the Maribor position. Final salary calculations take into account living costs of the recruiting country. Additionally to salary, living allowance and mobility allowance will be granted. Additional family allowances are available when applicable.

**APPLICATION PROCESS:** Applicants must select one of the two available projects, the main host institution being either PolyOrgLab (Slovenia) or TU Vienna (Austria). Required documents:

- Cover-letter stating your motivation
- Statement of adherence to the mobility rule
- CV including a list of publications, conference contributions, and other scientific activities (if applicable)
- Copies of education certificates and transcripts
- Proof of English proficiency
- 1 letters of reference and 2 names (with contact information) of recommenders.

The UNI Maribor and TU Vienna are equal opportunity employers aiming to increase the proportion of women within scientific and artistic staff and thus strongly encourage qualified women to apply. Persons with disabilities are especially encouraged to apply.

**SUBMISSION:** Applicants should submit before February 28<sup>th</sup> 2018 the documentation to Prof. Peter Krajnc (PolyOrgLab) peter.krajnc@um.si and Prof. Robert Liska (TU Vienna) robert.liska@tuwien.ac.at writing in the subject line the main host institution of their selected projects (e.g. Projects PolyOrgLab or Project TU Vienna). Applications will be reviewed until the positions are filled. Applications failing to include the requested documentation, where the candidates do not meet the eligibility criteria or which do not indicate the preferred projects WILL NOT be considered.

**SELECTION PROCESS:** Shortlisted candidates will be invited for in-person interviews (on site or by telephone / Skype). We will endeavour to provide feedback to unsuccessful applicants where possible.

**BENEFITS:**

- A highly valuable double expertise in the two predominant zero-VOC polymerisations: photopolymer science and polymerisation in dispersed systems
- Interdisciplinary supervision. The PhD student will be supervised by two academics from different disciplines: PolyHIPEs and Photopolymerization and an industrial mentor.
- 4-month industrial secondments
- Meaningful and innovative training methods: tandem PhD, distance language learning, ESR as itinerant science educator, online courses, PhD-led subproject, highly interactive meetings and tutorials, etc.

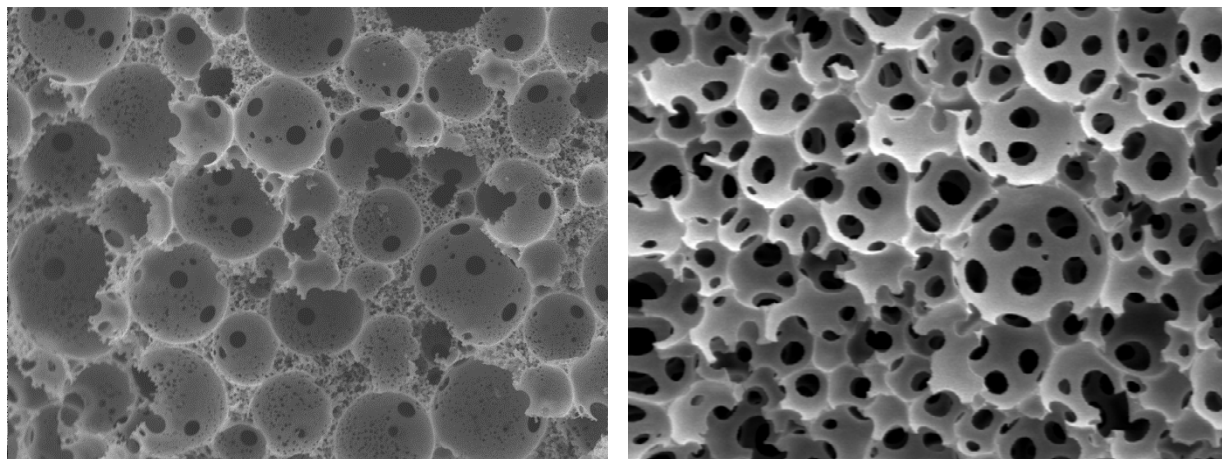


Fig. 1: Poly high internal phase emulsion (PolyHIPE) materials.

[1] C. E. Hoyle and C. N. Bowman, *Angew. Chem., Int. Ed.*, **2010**, *49*, 1540–1573.

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