

## DC7: Thionolactone monomer design for a new generation of (bio)degradable acrylic ink for 3D printing

**Host institution:** CNRS Soft Matter Chemistry Laboratory (CNRS-SOFTMAT), University Toulouse III – Paul Sabatier, Toulouse, France

**Supervisor:** [Prof. Mathias Destarac](#)

**Co-supervisors:** Dr. Stéphane Mazières (CNRS-SOFTMAT), Dr. Dina Maniar (University of Groningen)

**Project description:** The development of advanced wound care devices increasingly relies on additive manufacturing technologies, yet the lack of suitable degradable and functional polymeric inks remains a major limitation. Conventional acrylic resins used in 3D printing are typically non-degradable, restricting their application in biomedical contexts where controlled degradation and biocompatibility are essential.

This PhD project focuses on the design of a new generation of (bio)degradable polymeric materials for 3D printing, based on thionolactone monomers. In particular, the project will investigate the reactivity of thionolactone derivatives to enable their effective incorporation into acrylic polymer systems via radical polymerisation.

A key objective is to establish precise control over polymer composition and microstructure, allowing the tuning of degradability and material properties. This includes understanding structure–reactivity relationships in copolymerisation processes and evaluating degradation pathways under chemical and enzymatic conditions. These materials will be developed with the aim of producing functional, degradable inks suitable for advanced additive manufacturing techniques.

The doctoral candidate will be trained in polymer synthesis, radical polymerisation, and material characterisation, as well as in the development of functional materials for biomedical applications. The outcomes will contribute to the creation of sustainable and high-performance materials for 3D-printed medical devices within the broader HEAL-4WARD programme. The degree-awarding institution is the University of Toulouse.

**Host laboratory:** The SOFTMAT laboratory -Chemistry of colloids, polymers & complex assemblies- is dedicated to soft matter chemistry. It focuses on organised systems made up of surfactants, polymers, biomolecules or nanoparticles. Thanks to its expertise in organic and polymer synthesis, as well as in formulation chemistry, new smart molecular or polymer architectures can be designed. The studied systems have a wide range of applications in life sciences, materials and environmental sciences.

At SOFTMAT, the “Precision polymers by radical processes” group (P3R) develops original polymer materials using radical chemistry. P3R has a longstanding experience in reversible addition-fragmentation chain transfer (RAFT) polymerisation. In recent years, we made a clear shift in the way we design our polymers towards materials of enhanced sustainability. For instance, new methodologies for making degradable polymers by radical copolymerization have been successfully developed. Another recent strategic area is the design of dynamic polymer materials, in particular nanostructured vitrimers and carbon-fiber reinforced vitrimer materials for the aerospace sector.

We attach particular attention to the exploitation of our research results through a large number of patent applications with some examples of commercial success in collaboration with industrial partners.

**Secondments:** This project is carried out in collaboration with the following groups, and visits to their laboratories are expected during the project. A willingness to travel and spend time abroad is therefore essential:

- [Dr. Vincenzo Taresco](#), University of Nottingham, Nottingham, United Kingdom
- [Dr. Dina Maniar](#), University of Groningen, Groningen, Netherlands

**Eligibility conditions:**

- Master's degree or equivalent in Chemistry, Materials Science or related fields.
- Applicants must be doctoral candidates, i.e. not already in possession of a doctoral degree.
- Mobility rule: researchers must not have resided or carried out their main activity in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.

**Required skills:**

- Experience in polymer chemistry or organic synthesis (e.g. radical polymerisation, monomer synthesis), ideally demonstrated through Master's thesis work or research internships.
- Familiarity with polymer characterisation techniques (e.g. NMR, SEC, DSC, rheology) and structure–property relationships of polymers would be beneficial.
- Prior exposure to materials for additive manufacturing or 3D printing is an advantage.
- Proficiency in the English language is required, as well as good communication skills, both oral and written. Successful candidates will need to provide an English test (e.g. IELTS, TOEFL, Cambridge English). You may be exempt if you are a national of a majority native-English speaking country, or have qualifications / degree that has been taught and assessed in English. The supervisor may also confirm that a candidate has the required level of English.

**Remuneration:**

The Doctoral Candidate will receive a gross monthly salary of EUR 4003.34 in accordance with the MSCA Doctoral Networks programme, including a living allowance, a mobility allowance and a family allowance (if applicable). This amount corresponds to the contractual gross salary and is indicated before deduction of employee taxes and social security contributions. The net salary will depend on local taxation, social security and employment regulations.

**Enquiries:**

For general information about the HEAL-4WARD Doctoral Network visit the project website ([www.heal-4ward.eu](http://www.heal-4ward.eu)) or send an email to [heal4ward@gmail.com](mailto:heal4ward@gmail.com). For additional information on this project please contact Prof. Mathias Destarac ([mathias.destarac@utoulouse.fr](mailto:mathias.destarac@utoulouse.fr)).

**How to apply**

- Apply directly at the host institution website: [emploi.cnrs.fr/Offres/Doctorant/UMR5623-MATDES-008/Default.aspx](http://emploi.cnrs.fr/Offres/Doctorant/UMR5623-MATDES-008/Default.aspx)
- Apply via Eraxess: [euraxess.ec.europa.eu/jobs/431886](http://euraxess.ec.europa.eu/jobs/431886)

**Required documents:**

- Statement of interest (limit of 2,500 characters) explaining why you wish to be considered for the fellowship and which qualities and experience you will bring to the role.
- Curriculum vitae et studiorum.
- A certificate of University examinations taken (with marks).
- A final degree certificate translated in English. If, at the time of application, candidates should not be yet in possession of a degree certificate, they can submit it at the time of the examination.

A limited number of applicants will be invited for an interview and will be required to provide contact information of up to two contact person for reference letters.

**Application deadline:** The closing date for applications is **18 May 2026**.