

6-month internship topic

Liquid Embolic Agents for the Treatment of Malignant Tumors

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Team website: <https://www.ics-cnrs.unistra.fr/equipe-pecmat.html>

Approximate starting date: February 2023

Embolization is the process of occluding blood vessels as a treatment for malignant tumors. A wide range of embolic agents, such as coils, plugs, particulates, and liquid agents are currently used in clinical applications. Liquid embolic agents are particularly interesting for their fluidity and their capacity to load and deliver drugs.^[1] Important factors in the design of liquid embolics are (i) their flow behavior for optimal delivery through microcatheters and (ii) their solidification kinetics for effective occlusion of the vessel. Merit Medical, one of the leading companies in this field, recently developed novel liquid embolics based on charged polymers, known as polyelectrolytes. These embolic agents are soft, water-based materials with widely adjustable mechanical properties.

The main objective of this internship is to formulate and characterize the mechanical properties of novel liquid embolic agents in aqueous and physiological media. The intern will first formulate different liquid embolics based on the components provided by Merit Medical. They will then study the flow and viscoelastic behavior of the liquid embolics using underwater rheology. They will also characterize the solidification kinetics of the most promising embolic agents in a physiological buffer. This will be done using micro-indentation tests on thin films. The intern is required to hand in regular progress reports and to participate in group meetings as well as progress meetings with the R&D department of the company.

Candidate's profile and selection criteria: An open-minded, curious, and motivated master's or last year engineering school student in the field of materials science or polymers. Interest or experience in polymers, hydrogels, and or mechanical characterization is a plus. Applications are assessed based on relevance, motivations, and DE&I (Diversity, Equity, and Inclusion). Fluent communication in English (oral and writing) is a requirement.

Note: The internship is a collaboration between PECMAT team from ICS and the R&D team of Merit Medical. The intern will work at ICS (Cronenbourg campus).

How to apply: Please send a CV and a motivation letter (*both in English*) to mehdi.vahdati@ics-cnrs.unistra.fr and fouzia.boulmedais@ics-cnrs.unistra.fr.

References:

[1] Jiang, et. al., *ChemPhysMater*, 1, 2022, 39-50.