Doctoral candidate 6: Model-based region of interest 4DCT of smart materials

Host Institution	Technical University of Denmark
PhD enrolment	Technical University of Denmark
Primary Supervisor	Dr. Rajmund Mokso
Subject area	Tomography, 3D printing, hydrogels, tissues

About this doctoral project and your tasks

Hydrogel based 3D tissue cultures offer new opportunities to model human disease and support the development of novel therapies, given the ability to manufacture and analyse the tissue models reproducibly. X-ray tomography has the potential for providing unique quantitative measurements of the shape of 3D printed hydrogel culture devices and of shape changes induced by the cultured tissues. This will require development of new imaging modalities to provide micron or even sub-micron spatial resolution in water-filled hydrogels and living tissues with only minor spatial electron density contrast. The developed modalities should ideally be applicable in both academic and industrial settings.

You will consider two approaches to increase the contrast: first to enhance the electron density at the interfaces between the studied structures and surrounding water, second to apply the most sensitive phase contrast methods feasible at the laboratory instrumentation. You will in particular cases use synchrotron imaging, mainly as ground truth for the transition to the laboratory X-ray methods. The emphasis of the project will be on being able to image the 3D printed cell culture systems in realistic conditions deploying and optimizing state-of-the-art tomographic and phase reconstruction techniques. This challenging task will require smart design and efficient integration of sample environments.

Your tasks will include :

- Demonstration of the first phase contrast micron and sub-micron resolution 3D images of hydrogel systems for cell culture with laboratory- and synchrotron-based X-ray tomographic scanners.
- Development of an X-ray dose optimised fast imaging concept to characterise static and dynamic shapes of 3D printed hydrogels and cell cultures, and other samples relevant for the consortium, with emphasis on the need for acquisition in aqueous environments.

Foreseen secondments

For this project, we foresee secondments to:

- **Dr. Sandra Wilson** (3 months) at Sophion Bioscience A/S (Denmark)
- **Prof. dr. Jan Sijbers** (2 months) at University of Antwerp (Belgium)

Funded by the European Union

X-CELERATE is an MSCA-Doctoral Network funded by the European Union, starting in December 2025 (GA No. 101227146).

About the host institution and research group

DTU develops technology for people. With our international elite research and study programmes, we are helping to create a better world and to solve the global challenges formulated in the UN's 17 Sustainable Development Goals. Hans Christian Ørsted founded DTU in 1829 with a clear vision to develop and create value using science and engineering to benefit society. That vision lives on today. DTU has 13,500 students and 6,000 employees. We work in an international atmosphere and have an inclusive, evolving, and informal working environment.
The project will be carried out at two departments: DTU Physics and DTU Health Tech. 3D printing of hydrogels and culture of tissues are developed at DTU Health Tech while the X-ray imaging methods are developed and applied at the 3D Imaging Center of DTU Physics.

About the offer

- The selected candidate will be employed by Technical University of Denmark for **36 months** on the MSCA-DN project.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. DTU has received the following EU-grant to recruit a Doctoral Candidate (DC): monthly Living Allowance € 5.325,28; monthly Mobility Allowance € 710; and monthly Family Allowance € 660 (only if applicable). Please note that the final monthly, gross salary will result from deducting (from the mentioned amounts) all compulsory national labour taxes (social security, etc.) to be borne by the employer. Moreover, funding is available for technical and personal skills training and participation in international research events.
- **Expected start date**: between April and September 2026. We encourage last-year master students who will graduate by this time to already apply.

More information is available in the general information document for X-CELERATE positions.

Specific Profile requirements

- Your profile aligns with the general requirements and eligibility criteria of the X-CELERATE project.
- You have a master's degree in **physics, computer science, mathematics, engineering, or related field** (or will have by the time of your appointment).
- Background in **scientific computing and/or computed tomography** is appreciated.
- You are proficient in at least one programming language

How to apply

All applications must be submitted via the **X-CELERATE job platform.**

Deadline for applications: 16 November, 23:59. More information about the application procedure is available in the general information document for X-CELERATE positions.

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Additional information

For additional information about the research project, contact:

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