



# PhD in INGEGNERIA DEI MATERIALI / MATERIALS ENGINEERING - 39th cycle

## THEMATIC Research Field: HYDROGELS FOR CULTURED MEAT

### Monthly net income of PhDscholarship (max 36 months)

**€ 1400.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

### Context of the research activity

#### Motivation and objectives of the research in this field

Titolo: Food for future: 3D plant-derived structures to produce adipose tissue as innovative food ingredient for cultured meat

Acronimo: Food for future

CUP: D53D23005330001

Codice Progetto 2022ABPX8X

Decreto di Concessione D. D. n. 966 del 30 giugno 2023

The production of cultivated meat presents distinct challenges concerning production scale, cost, and the desired characteristics of the end-product, including texture and food safety.

One commonly employed 3D culture technique is the use of hydrogels, which offer the advantages of time efficiency and simple preparation without the need for specialized instruments. Furthermore, hydrogels with carefully designed structures can facilitate cell growth, enhance cell proliferation, and improve differentiation efficiency by providing patterned cues. As a result, they can be used, for instance, to create 3D muscle structures through stacking or rolling.

Presently, the creation of hydrogels for cell-cultured meat applications faces limitations in terms of using food-grade materials, achieving optimal cell adhesion, proliferation, and differentiation capabilities. Hydrogels exhibit tissue-like elasticity due to their hydration level. Additionally, their structure and composition can be adjusted to achieve specific chemical, physical, and biological attributes as required. This project aims to investigate hydrogels



	<p>derived from plants or fungi to culture fat and muscle cells.</p> <p>Initially, the focus will be on enhancing cell adhesion and differentiation through the optimization of hydrogels.</p> <p>Subsequently, the project will explore the feasibility of creating aligned hydrogel structures for the cultivation of muscle cells.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>he plant, or fungal, derived hydrogels used in this project will be fully characterized in terms of rheological, mechanical and chemical-physical properties to understand the structure-properties relationships. If needed, the properties of the developed materials will be tuned by means of blending or copolymers.</p> <p>The technologies employed to align gel fibers and, subsequently, muscle cells will be subject to a thorough characterization process. Complex structures that involve hydrogels loaded with cells will undergo TPA (Texture Profile Analysis) analysis.</p>
<b>Educational objectives</b>	<p>The PhD student will improve her/his skills, working group interactions, and know-how in materials science, especially plant-based hydrogels and their possible application for food technology and lab-grown food ingredients, exploiting tissue engineering techniques, advanced technological processing, and chemical-physical investigation techniques</p>
<b>Job opportunities</b>	<p><i>Post-doc in high-level universities (Italian and European) Researchers in start-up or spin-off developing new ideas in the food engineering field. Consultancy in engineering industries.</i></p>
<b>Composition of the research group</b>	<p>3 Full Professors 3 Associated Professors 4 Assistant Professors 5 PhD Students</p>
<b>Name of the research directors</b>	<p>Prof. Lina Altomare. Prof Luigi De Nardo</p>

<b>Contacts</b>	
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p><b>Educational activities</b> (funding for participation in courses, summer schools, workshops and conferences) - financial aid per PhD student per year:</p> <p>1<sup>st</sup> year: around 1.900 euros per student</p> <p>2<sup>nd</sup> year: around 1.900 euros per student</p> <p>3<sup>rd</sup> year: around 1.900 euros per student</p> <p><b>Teaching assistantship:</b> availability of funding in recognition of supporting teaching activities by the PhD student: There are various forms of financial of for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation</p>