

### DC4 – Job Vacancy

<b>Position Description</b>	
<b>Reference</b>	DC4
<b>Title of the project</b>	Multilayer polymer capsules with sono-responsive properties as antibody nanocarriers capable of crossing the blood-brain barrier
<b>Recruiting Institutions</b>	(1°) University of the Basque Country-POLYMAT (Spain, 24 months) and (2°) Italian Institute of Technology (Italy, 12 months)
<b>Secondment</b>	Polimerbio S.L., Vetex
<b>Expected Start Date (estimated)</b>	Latest August, if possible, March/April

<b>Job Offer Description</b>	
<b>Keywords</b>	Glioblastoma; nanocapsules; sono-dynamic therapy; in vitro models.
<b>Project description</b>	The topic of this project will be mainly focused on the development of therapeutic polymer capsules capable of crossing the blood-brain barrier (BBB). Due to its multidisciplinary nature, a background in materials science, nanotechnology, biotechnology, chemistry, or related field is warmly welcome. The early stage researcher will be involved in the formulation of multifunctional polymer capsules and their testing and validation in advanced in vitro models of the BBB. The first task of the project will consist on the development of polymer capsules via the layer-by-layer approach. These capsules will be used as delivery vehicles for a therapeutic antibody and will also respond to ultrasounds to exploit the sono-dynamic therapy. Extensive surface-modification strategies will be explored with the aim of boosting the capacity of the capsules to actively cross the BBB and be accumulated in the disease area.
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. Fabricate hybrid multilayer polymer nanocapsules via LbL approach and test their sono-responsiveness.</li> <li>2. Decorate the surface of the nanocapsules with peptide shuttles and study the effect in promoting their migration across the blood-brain barrier in rabbit models in vivo.</li> <li>3. Validate the therapeutic potential of the nanocapsules using glioblastoma spheroids under irradiation with therapeutic ultrasound.</li> <li>4. Validate the capacity of the nanocapsules to cross the BBB model in vitro in dynamic bioreactors.</li> <li>5. Follow standardized (ISO) protocols for the sterilization of medical devices and in vitro validation to evaluate their potential</li> </ol>

	for future clinical trials (not considered within the frame of the present project).
<b>Expected Results</b>	Multilayer polymer nanocapsules will protect the encapsulated antibody and will deliver it in its active form under tumor-associated stimuli (overexpression of enzymes and reduced pH). Incorporation of sono-responsive nanoparticles will provide advanced functionalities to the capsules by the generation of reactive oxygen species under ultrasound irradiation, enabling a combinatorial therapy against cancer. Decoration of the surface with peptide-shuttles will improve the extravasation of the nanocapsules across BBB.
<b>Supervisors</b>	Dr. Aitor Larrañaga (University of the Basque Country-POLYMAT), Dr. Gianni Ciofani / Dr. Matteo Battaglini (Italian Institute of Technology), Dr. Arianna Menciassi (Scuola Superiore Sant'Anna di Pisa)
<b>Work in the secondment</b>	A 3-months secondment at the company Polimerbio S.L. is envisioned, where standardized sterilization protocols for the capsules will be applied. An additional 3-months secondment at Vetex will allow testing the best formulations in in vivo models.

<b>Vacancy requirements</b>	
<b>Qualifications</b>	Solid background in materials science, nanotechnology, biotechnology, chemistry. Having a master degree or equivalent diploma, and not having a doctoral degree.
<b>Requirements</b>	MSCA-recruiting rules are applied. Not having resided in Spain for more than 12 months in the 3 years immediately before the recruitment date, and not having carried out their main activity (work, studies, etc.) in Spain during this period.
<b>Languages</b>	Excellent command of written and spoken English is a must
<b>Skills</b>	Ability for research management, dissemination, communication with colleagues and supervisors, strong teamwork spirit, creativity, problem solving and attention to safety
<b>Experience</b>	Research experience in the academic or industrial sector will be considered

<b>Job Details</b>	
<b>Salary</b>	Salary and benefits will follow the rules of the MSCA-DN, as foreseen in the Marie Skłodowska-Curie Actions Work Programme. Gross salary per month in Spain: 3104,20€ (3400€ per month*CCC Spain (91,3%)) + 600 € mobility allowance Gross salary per month in Italy: 3.311,60€ (3400€ per month*CCC Spain (97,4%)) + 600 € mobility allowance  *CCC (Country Correction Coefficient)
<b>Other benefits</b>	Other benefits: Gross family allowance: 660€ per month - if applicable*



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	*The family allowance will also be made available to researchers whose parental status changes during their project.
<b>Duration</b>	36 months
<b>Type of contract</b>	Full time
<b>Place of work</b>	<i>University of Basque Country: Bilbao, Spain (24 months</i> <i>Institute of Technology: Pisa, Italy (12 months)</i> The prospective Ph.D. will be, upon successful accomplishment of their course of studies, awarded with a double degree by the University of the Basque Country and Scuola Superiore Sant'Anna di Pisa.