

**Marie Skłodowska Curie Action–Postdoctoral Fellowship 2025
(MSCA-PF-2025)**

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Department /Institute /Centre	Name	Dto. Física Aplicada e Ingeniería de Materiales, Escuela Técnica Superior de Ingenieros Industriales. Centro Laser (UPM)
	Address	José Gutierrez Abascal 2
	Province	Madrid
Research Area		Life Sciences (LIF) Physics (PHY)
Brief description of the Centre/Research Group		<p>The UPM Laser Centre is an international reference centre in various areas of laser technology, with more than 20 years of experience working in strategic technological sectors (automotive, aeronautics, energy, biomedicine, construction, etc.). During all these years he has developed, and transferred to industry, laser processes for cutting, welding, heat treatment, process control, micro and nano processing, modelling of laser-matter interaction, etc. In parallel, it has carried out intense scientific activity in most of these fields, with the corresponding dissemination activities and the generation and protection of intellectual property, including the creation of two technology-based companies. In addition, the Centre has developed an important training activity in many aspects of laser safety for industry.</p> <p>At international level, it is internationally recognised in laser processes for the photovoltaic and flexible electronics industry, high-energy processes for the surface treatment of metallic materials to improve their lifetime performance (Laser Peening, LP), and laser printing based on Laser Induced Forward Transfer (LIFT) techniques, mainly focused on bioprinting applications for tissue engineering.</p>
Project description		<p>LIFT technology is based on the transfer of material, through the action of a laser pulse, from a transparent donor substrate to an acceptor substrate. The action of the laser pulse generates a bubble of vapours in the fluid material (ink) just at the interface with the donor substrate. The expansion of the vapours generated leads to the expansion of the jet and with it the evolution of the transfer process.</p> <p>BA-LIFT is a variant of LIFT technology whose difference lies in the collection of a sacrificial film between the donor substrate and the ink deposited on it. On our bioprinting lab, polyamide is used as sacrificial film. It has the optical property of absorbing in the wavelength range of the laser ($\lambda = 532 \text{ nm}$), which prevents it from coming into contact with the ink and affecting its properties. In the specific case of bioinks, this prevents the laser light from affecting the cells. The second optical property of polyamide, which is key to the FE-BA-LIFT technology, is that it is transparent to visible and fluorescent light. This property makes it possible, in the case of bioprinting, to observe the cell cultures deposited on the donor substrate and the cells transferred to the acceptor by optical and fluorescent microscopy.</p>

Expression of Interest – UPM Supervisor

	<p>The project proposal consists of two stages. First, the design of inks for 3D printing of hydrogel-ceramic composites using FE-BA-LIFT that simulated the bone extracellular matrix. The second, development of a ceramic hydrogel-matrix bioink for bioprinting simulated bone tissue. In addition to the design of inks and bioinks and the optimisation of transfer and printing parameters, some key points of study will be the influence of the transfer process on the cellular processes and curing parameters of the hydrogel matrices, as well as their influence on cell viability.</p>
Applications: documents to be submitted and deadlines	<p>Curriculum vitae Letter of motivation Letter of references Deadline: 30th April 2025</p>