

## Marie-Skłodowska-Curie Actions – Postdoctoral Fellowships 2024

### INL Expression of Interest

<b>Research Group Leader /Research Group name:</b>	
João Piteira / Systems Engineering Group	
<b>Scientist in charge:</b>	
<b>Name &amp; surname</b>	Carla Carvalho; Andrea Cruz
<b>Contact email</b>	<a href="mailto:carla.carvalho@inl.int">carla.carvalho@inl.int</a> ; andrea.cruz@inl.int
<b>Short description of the research group, including URL if applicable (<i>Strengths and scientific achievements (publications, patents, etc.), important infrastructure (up to 2000 characters with spaces)</i>):</b>	
<p>The focus of Systems Engineering group is to bring nanotechnology developed at INL into form-factors compatible with applications in the areas of ICT, health, agri-food and environment. The high levels of integration and miniaturization required for such applications can be often achieved via custom-designed microelectronics solutions, in particular CMOS technologies that enable both high-performance and mainstream adoption of the resulting devices. Our mission is to use electronics and microelectronics combined with nanotechnology to solve challenges within the above areas designing and implementing hardware applications that are power, size and cost efficient.</p> <p>Our aim is to develop complete solutions and systems, either portable or handheld that enable meaningful applications of advanced sensing and actuating technologies in everyday work and life environments. The target level of complexity is integration of these functions into “smart” system-on-chip (SoC) or System-in-Package (SiP) hardware devices such as:</p> <ul style="list-style-type: none"> <li>- Advanced CMOS hybrid devices</li> <li>- Smart system integration</li> <li>- Ultralow power and autonomous wireless sensor networks</li> </ul> <p><a href="https://www.inl.int/research-groups/systems-engineering/">https://www.inl.int/research-groups/systems-engineering/</a></p>	
<b>Project title:</b>	
Sense2Treat – Dual microfluidic device for point-of-care diagnosis of bloodstream infections and patient risk stratification	
<b>Project description (<i>up to 2000 characters with spaces</i>):</b>	
<p>Bloodstream infections (BSIs) are caused by the presence of bacteria in blood. If not treated, it can evolve into sepsis, a life-threatening organ dysfunction, caused by a dysregulated host response to infection. This is a major cause of death worldwide and thus has been appointed by the World Health Organization (WHO) as a key healthcare priority for the decade.</p> <p>The conventional methodologies for pathogen detection take at least 2-3 days to identify the pathogen and its antibiotic susceptibility which hinders a timely and appropriate antibiotic treatment with the consequent deterioration of the patient’s health. The time for diagnosis is very critical for this type of infection since there is an 8% increase in mortality for every hour of delay in antibiotic administration.</p>	

**Sense2Treat** proposes to develop a dual microfluidic device for rapid and point-of-care diagnosis of BSIs and risk stratification of patients. It is highly innovative since it can screen for different bacterial pathogens and relevant host response markers simultaneously, with “sample-in-answer-out” results in less than 2 hours. This device will present high sensitivity and specificity (>90%) due to the use of specific recognition molecules for bacteria and biomarkers. Moreover, the combined information provided by this device will enable timely and better-informed diagnostics that will drive personalised treatment to prevent clinical deterioration. We envisage that this approach will enable better management of patients with BSIs, with an important impact on healthcare settings.

**Sense2Treat** will have a deep impact on most of the challenges and trends identified in Europe as priorities for innovation deployment in the management of bacterial infections and reduction of antimicrobial resistance, which continue to pose a major threat to the health, economic stability, resilience and security of the EU, and the global community.

**Research fields (You may choose more than one)**

Chemistry (CHE)		Life Sciences (LIF)	X
Economic Sciences (ECO)		Mathematics (MAT)	
Environment and Geosciences (ENV)		Physics (PHY)	
Information Science and Engineering (ENG)	X	Social Sciences and Humanities (SOC)	

**Expiration date for Expressions of Interest from postdoctoral fellows:**

**Necessary documents to be submitted (in addition to the required CV and motivation letter):**

