Marie-Skłodowska-Curie Actions – Postdoctoral Fellowships 2024

INL Expression of Interest

Research Group Leader /Research Group name:	
Leonard Deepak Francis/ Nanostructured Materials Group	
Scientist in charge:	
Name & surname	Leonard Francis
Contact email	leonard.francis@inl.int

Short description of the research group, including URL if applicable *(Strengths and scientific achievements (publications, patents, etc.), important infrastructure (up to 2000 characters with spaces)):*

The Nanostructured Materials group is involved in investigating fundamental aspects and dynamic phenomena at the atomic scale. This is achieved by employing state of the art aberration corrected TEM/STEM imaging and In situ experimentation in combination with image processing, simulations and theoretical calculations. The group works with state-of-the-art advanced electron microscopes including In situ TEM techniques. For more information related to projects, people etc. please look at the group website: https://inl.int/research-groups/nanostructured-materials

For more information on the publications of the group leader: http://orcid.org/0000-0002-3833-1775

Project title:

1D magnetic van der Waals heterostructures

Project description *(up to 2000 characters with spaces):*

In this project, we shall explore the 1D vdW analogs of 2D vdW heteostructures (vdW HS). 2D materials are relatively easy to stack as vdWHS, and there is a plethora of such structures in the literature. However, the formation of the 1D VdWH is not trivial due to the challenges involved in rolling up the 2D materials into their 1D counterparts to form nanotube heterostructures[1,2].

This current project is dedicated to studying novel magnetic 1D van der Waals heterostructures (1DvdWH) using carbon nanotubes (CNTs) as growing templates. In this approach, magnetic phases encapsulated within multi-walled CNTs (MWCNTs) forming the corresponding 1DvdWHS will be formed and investigated by a combination of advanced electron microscopic techniques including Aberration Corrected STEM, 4D-STEM, magnetic imaging in the TEM, along with cryo-STEM/TEM to look at structure at the atomic scale and structural phase transitions in order to correlate it with their magnetic behavior.

The type of 1DvdWHs this project will address are magnetic monolayers of several compounds rolled-up to form single-layered nanotubes, including both materials for which the 2D form already exists as well as other layered compounds that have not been created in 2D form yet.

Ref:

1. Single Walled BiI3 Nanotubes

Encapsulated within Carbon Nanotubes, Scientific Reports 2018, 8, 10133.

2. Morphological phase diagram of a metal halide encapsulated in carbon nanotubes J. Phys. Chem C, 2018, 122, 24967–24976

Research fields *(You may choose more than one)*			
Chemistry (CHE)	X	Life Sciences (LIF)	
Economic Sciences (ECO)		Mathematics (MAT)	
Environment and Geosciences (ENV)		Physics (PHY)	X
Information Science and Engineering (ENG)		Social Sciences and Humanities (SOC)	

Expiration date for Expressions of Interest from postdoctoral fellows:	**31-07-2024**

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

Full list of Publications, PhD thesis title and abstract