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| Title of the thesis | Dimensionality engineering of heteronanostructures |
| Acronym | METEOR |
| Reference number | 024 |

| Hosting institution | Employer |
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| Université de Lille Website: https://www.univ-lille.fr/home/ | CNRS Website: https://www.hauts-de-france.cnrs.fr/fr/delegation |
| Hosting research unit 1 | Hosting research unit 2 |
| Name: Institut d'électronique de microélectronique et de nanotechnologie Acronym: IEMN Identification number: UMR 8520 Address: Cité Scientifique Campus Avenue Henri Poincaré CS 60069 - 59 652 Villeneuve d'Ascq Website: https://www.iemn.fr/ | Name: Unité Matériaux Et Transformations Acronym: UMET Identification number: UMR 8207 Address: Université de Lille Cité scientifique Bâtiment C6 59655 Villeneuve d'Ascq Website: http://umet.univ-lille1.fr/ |
| Principal supervisor | Co-supervisor |
| Name: Louis Surname: BIADALA Email: louis.biadala@iemn.fr Phone: +33 6 99 07 75 63 | Name: Gang Surname: JI Email: gang.ji@univ-lille.fr Phone: +33 6 51 34 52 88 |
| Foreign Co-supervisor | |
| Name: Iwan Surname: MOREELS Email: iwan.moreels@ugent.be University: UGent Research unit: Physics and Chemistry of Nanostructures Website: https://www.nano.ugent.be/ | |

| Thesis information | |
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| Keywords | dimensionality, heteronanostructures, HR-TEM, STM, electronic properties |
| Abstract | <p>Description of the PhD project: The METEOR project between IEMN and UMET labs from ULNE in co-tutelle with Ghent University (Belgium) and with the support of TU-Dormund (Germany) and the start-up company QustomDot (Belgium) aims at unveiling the electronic and optical properties of planar heteronanostructures (HNS) having various dimensionalities in order to transcend the properties of the standalone materials. The interdisciplinary approach of the project will enable correlating the colloidal growth of HNS to their structural, optical and electronic properties. This will lead to new breakthroughs in fundamental science and into the rationalization of device involving nanostructures.</p> <p>The goal of the METEOR project is to exploit the quantum confinement at the nanoscale to selectively restrict the degree of free motion of the charge carriers, i.e. the dimensionality, in each material composing the planar heteronanostructures. This <i>interdisciplinary</i> project (chemistry, physics) will require <i>international mobilities</i>. The growth of these HNS will be done by colloidal chemistry and will be carried out at UGent and in collaboration with QustomDot (Belgium). Their advanced structural properties (EELS, EDX, composition analysis) will be investigated down to the atomic scale at UMET lab by using a state-of-the-art FEI Titan Themis 300 Transmission</p> |

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| | <p>Electron Microscope. Their electronic properties will be unveiled in correlation with their geometry, down to the individual HNS, at IEMN by performing electronic density tomography with a low temperature scanning tunneling microscope. These studies will be enriched with academic and non academic secondments at TU-Dortmund (Germany), to perform spin-resolved optical experiments in magnetic fields, and at QustomDot to develop applications/devices. Upon success to project calls, characterizations in magnetic fields up to 37 T at the High Magnetic Field Lab (HFML) (Nijmegen, The Nederland) are envisaged.</p> <p>The candidate will have the opportunity to attend summer school organized by CNRS such as Les Houches or Cargèse, or in the framework of the Gordon Research Conference (GRC). The candidate will be able to attend prestigious conferences such as Nanoge, NanaX, GRC, Quantum dot conference, PCNSPA, JMC,...</p> <p>Labs involved: IEMN CNRS UMR 8520 (Louis Biadala, Hub 3), UMET CNRS UMR 8207 (Gang Ji, Hub 2). The project is done in the framework of a co-tutelle with UGent.</p> <p>Secondments: academic at TU-Dortmund (Germany)/ non academic QustomDot company (Belgium)</p> |
| <p>Expected profile of the candidate</p> | <p>We are looking for excellent and highly motivated candidates with a Master degree in physics, solid state physics, semiconductor physics or a relevant field. Experience in STM, electron microscopy, colloidal synthesis, UHV or confocal microscopy is an asset. The candidate is expected to be self-driven, to have strong work-capacity and enthusiasm for science. A good communication skills and command of English language, with excellent oral and written skills is required.</p> |
| <p>Application procedure & Eligibility criteria</p> | <p>The application procedure and eligibility criteria are detailed on the European doctoral programme PEARL website www.pearl-phd-lille.eu. The funding is managed by the I-SITE ULNE foundation which is a partnership foundation between the University of Lille, Engineering schools, research organisms, the Institut Pasteur de Lille and the University hospital.</p> <p>The application file will have to be submitted before March 31, 2021 (10:00 AM - Paris Time) and emailed to the following address : international@isite-ulne.fr.</p> |
| <p>Net salary and Lump Sum</p> | <p>A net salary of about €1,600 + €530 per month to cover mobility, travel and family costs.</p> |