CALL FOR GROUP LEADERS AT ENSEMBLE^3

Centre of Excellence for nanophotonics, advanced materials and novel crystal growth-based technologies

ENSEMBLE^3 is a new Centre of Excellence for nanophotonics, advanced materials, and novel crystal growth-based technologies located in Warsaw, Poland, created jointly by institutions from Poland, Germany, Italy, and Spain. The centre will work on the development of novel material technologies and advanced materials with unique electromagnetic properties, with potential applications in fields such as photonics, optoelectronics, telecommunication, solar energy conversion, medicine, and aerospace.

Applications are welcome from the excellent scientists to establish and supervise the following research groups at the Centre. (i) Light Matter Interaction Theory, (ii) Optical Nanocharacterization, (iii) Photonic elements, (iv) Biophotonic Applications, (v) Density Functional Theory/First Principle Modelling, and (vi) III-V compound Semiconductors

Light Matter Interaction Theory: The light-matter interaction theory group will work as the scientific feedback loop between experiment and theory to design new experiments and comprehend their outcomes. For the planned scientific projects in the centre, numerical solutions of the classical vector Maxwell equations for complex micro- or nanostructures in optics & photonics in three dimensions will be the priority. The aim of the group will be both to model the light-matter interactions in the structures developed in the centre to explain the observed optical phenomena as well as to provide ideas and designs for new materials and new phenomena to be made and observed. The theory group will focus on the application of existing state-of-the-art numerical methods, available via commercial program packages. The development of novel methods will only be addressed if specific results cannot be achieved. Advanced program packages such as Comsol Multiphysics could be employed for that purpose.

Optical Nanocharacterization: The group will unveil outstanding and useful optical properties at the nanoscale in innovative materials such as those developed at the Centre. It will contribute at demonstrating novel design concepts opening the path to materials and devices with unprecedented performance. A special attention will be paid to: (i) plasmonic, polaritonic, epsilon-near-zero, high refractive index, cavity, and hybrid optical phenomena; (ii) managing the harvesting and emission of light; (iii) controlling and harnessing the propagation, confinement, polarization, and spectrum of light. These properties will be explored across the ultraviolet, visible, and infrared ranges in advanced materials such as eutectic metamaterials or glasses doped with nanostructures. The exploration will be undertaken by state-of-the-art optical spectroscopy approaches (such as s-SNOM, nano- and micro- FTIR, TERS, TEF, time-resolved confocal fluorescence microscopy, micro-spectrometry, pump probe spectroscopy).

Photonic Elements. The group will be responsible for expanding applications for materials developed in the Centre to photonic elements and devices, which will be beyond the-state-of-the art in modern photonics and optoelectronics. Various properties and functionalities of the crystal-growth materials which will be developed in the Centre have already been demonstrated. These could be developed into applications, in addition to anticipated new ideas from the group leader and group members. Particularly interesting would be applications in lighting, telecom, nonlinear optics, THz sources, integrated optical isolators, photonic elements and devices and others. At the same time, proposing novel ideas for crystal-growth based materials with a potential for acting as photonic elements, demonstration of unique optical phenomena, and the potential use of such materials in optoelectronics will be the main scope of this group.

Biophotonic Applications: This group will be responsible for expanding applications for materials developed in the project and the Centre to biomedical elements and devices, which will be beyond the-state-of-the art in modern photonics and optoelectronics. Various properties and functionalities of the crystal-growth materials which will be developed in the Centre have already been demonstrated. These could be developed into bio/medical applications, in addition to anticipated new ideas from the group leader and group members. Proposing novel ideas for crystal-growth based materials with a potential for acting as biomedical elements and devices; demonstration of unique optical phenomena and the potential use of such materials biomedical applications including cancer diagnosis and health improvement will be the main scope of this group.

Density Functional Theory/First Principle Modelling: A new group leader is required in the realm of Density Functional Theory (DFT) with a passion in the realm of electronic structure calculations, material properties prediction, and quantum mechanical simulation. Using deep knowledge of solid-state physics and first-principles theory, this group will develop a fundamental understanding of materials properties at the atomic level and correlate them with basic elemental quantities. Such principles will be used to guide experimental research and to understand the fundamental physics of materials at the atomic level. The primary focus will be given to understanding materials realization (e.g., prediction synthesis conditions), understanding optoelectronic properties of quantum materials, doping physics, and tailoring materials properties in general. It is also important for us that the group leader collaborates with other groups in the Centre on the novel materials developed and to be developed.

III-V Compound Semiconductors. This group will be responsible for developing single crystal AIII-BV compound semiconductor materials in the direction of novel optoelectronic applications. The group will develop and investigate novel single crystals and technologies to make them as well as will collaborated in utilizing known materials for new applications. Particularly interesting would-be applications in lighting, telecom, nonlinear optics, THz sources, frequency conversion, and others. The know-how of the centre is based on the Łukasiewicz- Institute of Microelectronics and Photonics experience of over 30 years in the technology of AIIIBV compounds including synthesis, monocrystalization, mechanical processing and characterization. Our high purity and high-quality materials meet the world standards. In this field we carry out: (i) research and development of single crystals and alloys manufacturing methods; (ii) investigations of semiconducting materials properties (electrical, structural, optical) and purity; (iii) small scale production of materials such as GaAs, InAs, GaP, InP, GaSb, InSb and other special alloys of very high purity; (iv) development of manufacturing methods for thermoelectric materials, topological insulators and materials for spintronics.

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Scientific discipline:	Plasmonics, Metamaterials, Photonics, Optoelectronics, Physics, Chemistry, Material science, or related fields.
Job type:	Full-time employment.
Numbers of job offers:	5
Remuneration/amount/year:	Annual gross salary max. 268 000 PLN (~ 62 000 EUR) depending on experience and expertise.
Position start:	Available from May 2024 (Negotiable).
Period of contract agreement:	Permanent contract from the beginning possible based on the mutual agreement.**

Key responsibilities include:

- Establishing and supervising the research group;
- Organizing and carrying out research efforts that will place the centre at the forefront of scientific developments worldwide;
- Collaborating with other groups in the centre;
- Disseminating results to the public and scientific communities;
- Applying for funding;
- Seeking industrial collaborations.

We offer:

- Full-time employment;
- Opportunity to work in an innovative scientific environment;
- International cooperation with experienced researchers;
- Funds to recruit postdoc;
- Administrative support for recruiting, visa and related documentation;
- Access to well-staffed core facilities.

Required application documents:

Curriculum vitae; Proof of PhD; Research record with a full list of publications; Cover letter specifying how you meet the search criteria and can contribute to the operation of the Centre; Names and contact details of three senior researchers who may act as referees. A short description of a research plan that fits the research agenda of the Centre.

To Apply: Please visit: http://ensemble3.eu/careers

Or,

APPLY HERE

Application deadline: **20th March 2024** (recruitment remains open until a suitable candidate is found)

Competitive candidates will be interviewed before the appointments are made.

For further information, visit: www.ensemble3.eu

For questions, please contact: recruitment@ensemble3.eu

***We aim for group leaders to jointly develop our centre for a longer time. The Centre is funded through the International Research Agenda of the Foundation for Polish Science, under axis IV of the Smart Growth Operational Programme, Measure 4.3; the Teaming for Excellence H2020 programme and the Minister of Science and Higher Education, Poland.*

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