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15 Doctoral Researcher (FELLOW) 3-year PhD positions

TRADES - "Training & Research in Advanced Dispersion Engineered grating-waveguide Structures"

Organization/company:	Institutions across Europe in the TRADES Doctoral Network
Research field:	Physics > Optics > Laser applications, Optical engineering, Metrology and measurement
Researcher profile:	First Stage Researcher (R1)
Application deadline:	**February 15, 2026 00:00 (CEST)**
Type of contract:	Temporary
Job status:	Full-time
Hours per week:	35-40
Offer starting date:	July 1 – September 1, 2026
EU research framework program:	Horizon Marie Skłodowska-Curie Actions 2024 MARIE CURIE (MSCA-DN)
Grant agreement number:	101226599

We are pleased to advertise 15 Doctoral Researcher (PhD) positions to begin in 2026, as part of the Doctoral Network of the European Commission TRADES "Training & Research in Advanced Dispersion Engineered grating-waveguide Structures". The positions will each last three years, and will allow all students to participate in an exciting program comprising international schools, workshops, and secondments at academic, as well as industrial partners (see the overview of the project below).

Important: Please review the webpages of the individual vacancies via the IFSW website for details:
https://www.ifsw.uni-stuttgart.de/en/institute/vacancies/

Overview of the project and of the training offered to all Doctoral Researchers of TRADES

The TRADES doctoral training network aims to address a skills gap in the photonics sector by training a cohort of 15 doctoral candidates with the advanced skills necessary for the development of innovative and enabling photonics components.

The network will deliver a research and training program focused on key steps in product development – from concept, through sustainable production and precise characterization, right up to implementation.
It will also equip the doctoral candidates with the interdisciplinary skills necessary to drive the research forward.

The network fellows will design and develop robust dispersive components based on sub-wavelength gratings waveguide structures to produce gratings for both intra-cavity and extra-cavity applications in high power lasers operating in the 1 and 2 µm spectral regions. To do so, the fellows will push state-of-the-art deposition, lithographic, and etching techniques to their limits, and explore how they can be used to optimize the manufacturability, efficiency (>99.9%) and LIDT > 1J/cm2 for sub-ps pulses, of the final gratings.

In parallel, the fellows will be provided with non-academic research exposure and training in innovation management, enterprise, and entrepreneurship in a highly integrated format beyond the normal generic skills training. This will contribute to producing highly sought after graduates, who are capable of inventing, innovating, and converting knowledge into products and services for economic benefit and are fluent in the business planning and innovation management aspects of their research. All this will prepare the fellows for future careers in photonic technology research and development.

Host institutions	**PhD positions**
Universität Stuttgart (USTUTT)	3 PhD positions, Fellows 1 (IFSW), 2 (IFSW), and 3 (ITO)
University of Southampton (ORC)	2 PhD positions, Fellows 4 & 5
École centrale de Marseille (IF)	2 PhD positions, Fellows 6 & 7
University of Eastern Finland (UEF)	2 PhD positions, Fellows 8 & 9
Université Jean-Monnet, Saint-Étienne	2 PhD positions, Fellows 10 & 11
Fyzikální ústav Akademie věd České republiky (FZU) HiLASE	2 PhD positions, Fellows 12 & 13
Leibniz-Institut für Oberflächenmodifizierung (IOM: Leibniz Institute of Surface Engineering)	1 PhD position, Fellow 14
Université de Liège	1 PhD position, Fellow 15

The TRADES consortium also includes academic partner organizations:

- Tampere University TAU
- Czech Technical University CTU
- Technische Universität Dresden TUD

And private sector partners:

- FIBERCRYST SAS
- TRUMPF LASER GMBH
- AMPLITUDE SYSTEMES SA
- Dausinger + Giesen GmbH
- BÜHLER ALZENAU GmbH
- CRYTUR
- Neue Technologien GmbH / Co. KG.NTG
- MODUS Research and Innovation Ltd.
- SOLNIL
- European Photonics Industry Consortium EPIC

Interested applicants are strongly encouraged to contact the scientists in charge of the projects as soon as possible.

Available projects:

Details of each project can be found below or via the IFSW website:
https://www.ifsw.uni-stuttgart.de/en/institute/vacancies/

Summary of titles and host institutions for the 15 PhD positions:

FELLOW 1 (IFSW, Stuttgart, Germany):
Design and characterization of novel, highly tolerant and robust dispersive devices based on grating-waveguide structures.

FELLOW 2 (IFSW, Stuttgart, Germany):
Design and implementation of a compact grating compressor for high-power 1-micron lasers.

FELLOW 3 (ITO, Stuttgart, Germany):
Fabrication and characterization of pulse compression gratings using SBIL.

FELLOW 4 (ORC, Southampton, England):
Fabricating dielectric all-crystalline GTI-like GWS

FELLOW 5 (ORC, Southampton, England):
Fabricating GTI-like GWS on a silicon platform

FELLOW 6 (IF, Marseille, France):
High performance optical coatings for resonant grating structures

FELLOW 7 (IF, Marseille, France):
Laser damage resistance of materials and structures of pulse compressor GWS

FELLOW 8 (UEF, Joensuu, Finland):
Direct electron beam writing of pulse compressor GWS for high-power laser systems

FELLOW 9 (UEF, Joensuu, Finland):
Electron beam writing of master's for NIL of high-power laser system pulse compressor GWSs

FELLOW 10 (LabHC, Saint-Etienne, France):
Sol-gel based functionalized thin layer for direct grating printing

FELLOW 11 (LabHC, Saint-Etienne, France):
Large grating printing using phase mask based dynamic lithography

FELLOW 12 (FZU HILASE, PRAGUE):
Implementation of highly tolerant dispersive devices based on grating-waveguide structures in high power lasers at 1 and 2- micron

FELLOW 13 (FZU HILASE, Prague, Czech Rep.):
Characterization of novel and highly tolerant dispersive devices based on grating-waveguide structures

FELLOW 14 (IOM, Leipzig, Germany):
Advanced Technologies for reactive ion beam etching of pulse compression grating

FELLOW 15 (ULIEGE, Liège, Belgium):
Environmental footprint evaluation of grating waveguide structures in view of their eco-design, including criticality analysis

Additional information

The successful candidates will receive a 36-month, full-time employment contract as per Marie Skłodowska-Curie Actions (MSCA) regulations for doctoral researchers. The monthly salary will be confirmed upon offer, paid in the currency of the host country, and with a correction factor applied to the host country. The approximate monthly salary before employer and statutory deductions is €4,736 (France); €4,058 (Germany); €4,732 (Finland); €5,682 (UK), €3.774 (Czech Rep.), and €4.010 (Belgium), plus an additional mobility allowance of €710/month. Researchers may also qualify for a family allowance of €495/month depending on family situation at the time of recruitment. Please visit the EU MSCA website for further information.

The fellows will be enrolled in an exciting PhD program of leading academic and industrial researchers. In addition to their individual scientific projects, all fellows will benefit from a dedicated training program comprising an integrated curriculum of local and intensive network courses, schools, workshops and engagement with cutting-edge research.

Eligibility criteria

There are strict eligibility requirements within Marie Skłodowska-Curie Doctoral Networks. At the time of appointment, applicants must not have resided or carried out their main activity (work, studies) in the country for more than 12 months in the 3 years immediately before their appointment; AND shall also be in the first four years of their research careers at the time of appointment and have not been awarded a doctoral degree.

Offer Requirements, Skills and Qualifications

- Must have Masters (or equivalent) degree in Mechanical Engineering, Mathematics, Physics, or Photonics, with solid knowledge of optics and its applications.
- Must be in the first 4 years of his/her career, measured from the date of graduation (MSc degree or equivalent).
- Should not hold a PhD degree.
- Should not have resided or carried out their main activity (work, studies) in the country of their appointment for more than 12 months in the 3 years immediately before their appointment. For refugees under the Geneva Convention, the refugee procedure (i.e. before refugee status is conferred) will not be counted as 'period of residence/activity in the country of the beneficiary'.
- Must be able to communicate fluently in English, in oral and written form.
- Willingness to travel for secondments and collaborative activities within the TRADES network.

Important: Please review the webpages of the individual vacancies via the IFSW website for details:
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Selection process

Applicants will need to submit to trades@ifsw.uni-stuttgart.de, for each application:

- Brief description of why the applicant wishes to become a PhD student within TRADES (Letter of motivation).
- Copy of transcripts and of their Bachelor and Master degrees, and a copy of master's thesis and any other publications (if available).
- Curriculum vitae of three pages maximum.
- Two written recommendation letters (e.g. one by the former Master thesis supervisor and their referees contact details).

Job descriptions

FELLOW 1 (IFSW, Stuttgart, Germany):

Design and characterization of novel, highly tolerant and robust dispersive devices based on grating waveguide structures.

In this project, the selected doctoral candidate (DC) will focus on the implementation of design tools for precise modelling of key parameters of the GWS for the different applications (pulse compression and GTI-like GWS for 1 and 2-micron wavelengths).

- Accomplishment of precise measurement of the refractive indices of coated dielectric layers using ellipsometry and grating-based M-lines spectroscopy.
- Setup of new characterization setup for the 2-micron wavelength range.
- Accomplishment of precise characterization results for the measurement of the polarization and wavelength dependent reflectivity, diffraction efficiencies, absorption, and scattering losses of the different GWS developed in the project.

The characterization results shall be used in design routine to align simulations and experiments.

Specific requirements: Solid background in optics and laser physics, strong knowledge in programming or simulation tools (e.g. MATLAB, python or C), practical experimentation with optics and lasers. Ability to work in team.

FELLOW 2 (IFSW, Stuttgart, Germany):

Design and implementation of a compact grating compressor for high-power 1-micron lasers.

In this project, the selected doctoral candidate (DC) will focus on three main tasks:

- First, the DC will the design, build up and full characterization of a high-power (kW-Class) CPA-based thin-disk multipass amplifier using a novel, compact and patented pulse-compressor stage using the GWS developed in TRADES. An important part of the work of the DC will be dedicated to the full modelling, design and build-up of the compressor stage.
- Second, the DC will design and setup a thin-disk mode-locked oscillator in which the GTI-like GWS developed by *DC4* and *DC5* (ORC) will be qualified. Laser induced damage threshold (LIDT) in collaboration with *DC7* experiments at high-average power and >100KHZ repetition rate will also be part of the tasks.
- Furthermore, the DC will support *DC12* in the implementation of the novel compressor stage for the 2-micron wavelength lasers and will assist DC13 for the LIDT measurement of the GWS at 2-micron wavelength.

Specific requirements: Solid background in optics and laser physics, strong knowledge in programming or simulation tools (e.g. MATLAB, python or C), practical experimentation with optics and lasers.
Ability to work in team.

FELLOW 3 (ITO, Stuttgart, Germany):

Fabrication and characterization of pulse compression gratings using Scanning Beam Interference Lithography (SBIL).

The Institute of Applied Optics (ITO) at the University of Stuttgart has a strong background in optical metrology, diffractive optics, optics simulation and design. In this project, the researcher will explore high-resolution interference lithography processes for the generation of large linear gratings with diffraction-limited performance. This includes research on the optimal lithography process as well as new calibration approaches for SBIL systems.

- Investigation of methods to achieve nanometer level placement accuracy at high patterning speeds e.g. using fringe locking techniques.
- A new interferometric metrology system for the verification of the diffraction-limited performance of large area pulse compressors based on grating waveguide structures will be established.
- Close cooperation with design (DC 1), etching (DC 14) as well as replication (DC 9).

Specific requirements: We are looking for candidates with an excellent master's degree in optics, photonics or electric engineering, physics or comparable. Basic programming skills in Python, C++ and/or MATLAB are required. Good understanding of interferometry, cleanroom processes and control theory beneficial. We offer a PhD position in an open, cooperative atmosphere where initiative and own ideas are highly welcome.

FELLOW 4 (ORC, Southampton, England):
Fabricating dielectric all-crystalline GTI-like GWS

In this project the researcher will investigate:

- The optimization of sapphire-substrate etching and surface preparation methods
- Pulsed Laser Deposition processes for growth of high-optical-quality crystal films
- Methods to achieve good film-thickness uniformity and develop techniques to fabricate multi-layer Bragg mirror stacks – comprising alternating high-low refractive index materials.

In collaboration with DC1, designs will be made for all-crystalline waveguide and multi-layer mirror elements, with the aim to fabricate GWRs with bespoke reflectivity characteristics, including 1st-order diffractive configurations. Fabricated samples will then be characterized and tested to assess their performance with respect to design simulations, including integration into high-power thin-disk laser systems with DC2 and separately, measurement of their laser induced damage susceptibility with DC7.

Specific requirements: Basic knowledge in physics, materials science, photonics or equivalent fields, with a good understanding of the fundamentals of laser physics. Experience with programming or simulation tools and practical experimentation with optics and lasers are desirable.

FELLOW 5 (ORC, Southampton, England):
Fabricating GTI-like GWS on a silicon platform

In this project the researcher will explore CMOS-compatible fabrication methods applied to the silicon-wafer platform, thus capitalizing on standard processing methods – e.g., photolithography, e-beam lithography, or nanolithography patterning, coupled with reactive or physical etching methods – that would need to be advanced to cater for large aperture gratings.

Following successful realization of thin-substrate GWS, wafer-bonding to thicker substrates will be investigated to fabricate 'bulk-like' optics that can be utilized in thin-disk lasers or high-power pulse compression systems.

Fabricated samples will then be characterized and tested to assess their performance with respect to design simulations with *DC1*, and qualified in high-power 2-micron lasers with *DC12*.

Specific requirements: Basic knowledge in physics, materials science, photonics or equivalent fields, with a good understanding of cleanroom practices. Experience with programming or simulation tools and practical experimentation with optics and lasers are desirable.

FELLOW 6 (IF, Marseille, France):

High performance optical coatings for resonant grating structures

The research fellow will be responsible for the development of high-performance optical coatings for resonant grating structures. He/she will develop deposition processes for optical coatings exhibiting high laser-induced damage threshold (LIDT) and high reflectance over the targeted spectral region, on large-aperture substrates. All work will be carried out using a plasma-assisted reactive magnetron sputtering system (Bühler HELIOS), in close collaboration with the deposition equipment manufacturer.

The research objectives include optimization of the coating deposition process to improve thickness uniformity, investigation of film stress, and development of methods to compensate for or mitigate stress-induced deformations. The fellow will also investigate new coating materials with high LIDT in the near-infrared range.

A final and significant aspect of the work will focus on optical monitoring strategies to maximize the agreement between theoretical designs and experimental spectral responses. The candidate will ultimately be responsible for producing all optical coatings used within the TRADES project.

Required skills: Strong background in optics and photonics, Programming skills in MATLAB and/or Python, interest in nanotechnologies and cleanroom work, experience or competence in optical coatings is an asset.

FELLOW 7 (IF, Marseille, France):

Laser damage resistance of materials and structures of pulse compressor GWS.

The selected doctoral candidate 7 will work at the core of the TRADES project, focusing on the development, implementation and validation of advanced metrology methods to assess the laser-induced damage resistance (LIDT) of optical components operating around 1 and 2 µm.

The researcher will design and establish testing systems enabling accurate characterization of coatings, gratings and GWS produced within the consortium, under both CW/quasi-CW and picosecond regimes. A key aspect of the project is the optimization of materials, designs and fabrication processes to simultaneously achieve low optical absorption and high LIDT—an area where very limited scientific data currently exists at 1 and 2 µm. The DC will therefore work in close interaction with fabrication partners, operating in an iterative loop between measurement, understanding of failure mechanisms and feedback for technological improvements.

The position offers an excellent opportunity to contribute to pioneering research in an emerging spectral domain with strong industrial and academic relevance.

Specific requirements: Master's degree (or equivalent) in Physics, Photonics, Optics, Materials Science or a closely related field. Solid background in laser physics, nonlinear optics, ultrafast lasers or optical materials. Experience with optical characterization techniques. Hands-on skills in experimental photonics, including laser alignment, optical setups and data acquisition. Ability to analyze complex datasets, understand physical mechanisms and model laser–material interactions. Motivation to work in a highly collaborative, multidisciplinary and international research. environment.

FELLOW 8 (UEF, Joensuu, Finland):

Direct electron beam writing of pulse compressor GWS for high-power laser systems.

We are seeking a motivated researcher to develop advanced fabrication processes for large-area grating waveguide structures (GWS), which are used in high-power laser pulse compression. The role involves optimizing electron beam patterning and reactive ion etching techniques to achieve exceptional precision and efficiency.

The researcher will develop and establish direct electron beam patterning and reactive ion etching processes for GWS fabrication; fabricate test samples (approximately 10 mm) and full-sized gratings (>100 mm in diameter) for pulse compression at 1030 nm and 2000 nm with high efficiency (>99%) and stringent uniformity requirements (±2% duty cycle, line width ±4 nm and periodicity ±1 nm); and prepare process documentation and reports for future implementation.

The fabricated samples will be characterized in collaboration with DC1 and DC2 to assess their performance in relation to the design, and qualified for use with high-power lasers in collaboration with DC12.

Specific requirements: Basic knowledge in physics, materials science, photonics or equivalent fields is required, as well as a good understanding of cleanroom practices. Experience with programming or simulation tools and practical experimentation with optics and lasers.

FELLOW 9 (UEF, Joensuu, Finland):

Electron beam writing of master's for NIL of high-power laser system pulse compressor GWSs.

We are looking for a motivated researcher to develop and optimize electron beam lithography processes for the fabrication of master templates used in nanoimprint lithography (NIL) for the replication of grating waveguide structures (GWS) for high-power laser pulse compressors. The role will involve overcoming challenges relating to the accuracy of large-area patterning and compensating for process-induced deformations across multiple fabrication steps.

The researcher will develop electron-beam patterning strategies for NIL masters, considering subsequent replication steps; optimize parameters for linewidth and periodicity uniformity to meet stringent tolerances; fabricate master templates for NIL processes and test replication in-house; deliver high-quality masters to partners; and document fabrication processes for future implementation.

The fabricated samples will be characterized in collaboration with DC1 and DC2 to assess their performance in relation to the design, and qualified for use with high-power lasers in collaboration with DC12.

Specific requirements: Basic knowledge in physics, materials science, photonics or equivalent fields is required, as well as a good understanding of cleanroom practices. Experience with programming or simulation tools and practical experimentation with optics and lasers.

FELLOW 10 (LabHC, Saint-Etienne, France):
Sol-gel based functionalized thin layer for direct grating printing.

This PhD project focuses on the development and characterization of TiO_2- and HfO_2-based sol-gel materials specifically engineered for direct micro- and nano-structuring. The objective is to design UV-sensitive or NIL-compatible formulations enabling fast, low-cost fabrication of large gratings without etching. The work includes chemical synthesis, lithography structuration and characterization of the sol-gel layers. Large-area gratings will be produced using dynamic phase mask lithography and nanoimprint lithography. The candidate will fabricate masters meeting NIL specifications and demonstrate coherent sol-gel-based gratings on large-area substrates, highlighting the scalability and reproducibility of the process. The project will also focus on optimizing the full fabrication workflow, from sol-gel deposition to pattern transfer, in order to improve process stability and material performance. Furthermore, the PhD will contribute to demonstrating the potential of sol-gel formulations as versatile platforms for large-area micro- and nano-structuring, opening new perspectives for advanced optical components and innovative diffractive devices. The PhD will be hosted at Université Jean Monnet, Saint-Étienne.

Specific requirements: Master’s degree in Physics, Materials Science, Photonics, Chemistry, Nanotechnology, or a closely related field. Knowledge of micro- and nano-fabrication processes, such as UV lithography, nanoimprint lithography (NIL), or related patterning techniques. Experience with characterization techniques (spectroscopy, atomic force microscopy, scanning electron microscopy). Interest in interdisciplinary research, combining chemistry, physics, and engineering.

FELLOW 11 (LabHC, Saint-Etienne, France):
Large grating printing using phase mask based dynamic lithography.

Fabricating large-area diffraction gratings is a bottleneck for several applications such as ultra-high-power laser compression systems, high-resolution spectroscopy, and beam-shaping components for advanced optical instrumentation.

In this Ph.D. project, we propose to investigate on-the-fly interferometric lithography to enable large-scale (>300 mm × 300 mm) grating fabrication with high uniformity and throughput. Several approaches based on phase masks will first be considered and benchmarked through numerical modelling and small-scale experiments.

The Ph.D. candidate will subsequently adapt and optimize the toolset of the Laboratoire Hubert Curien and dedicated phase masks will be designed and fabricated to enable reliable large-area grating fabrication using this method. Emphasis will be placed on the study of fabrication tolerances, stability constraints during dynamic exposure, and the achievable resolution limits set by optical coherence, vibration sensitivity, and mask fabrication accuracy.

The project combines optical design, nanofabrication, precision engineering, and experimental validation, offering the candidate a unique opportunity to develop multidisciplinary expertise while contributing to a promising lithographic approach for next-generation optical components.

The PhD candidate will be hosted at **Université Jean Monnet, Saint-Étienne**, and will carry out their research within the NanoSaintEtienne technological platform.

Specific requirements: Master’s degree in Physics, Optics, Nanotechnology, Mechanical Engineering, or a closely related field. Knowledge of micro- and nano-fabrication processes, such as lithography or related patterning techniques. Experience with clean-room activities and characterization techniques (atomic force microscopy, scanning electron microscopy). Interest in experimental research.

FELLOW 12 (FZU HILASE, PRAGUE):

Implementation of highly tolerant dispersive devices based on grating-waveguide structures in high power lasers at 1 and 2-micron.

The aim of this PhD project is the design and characterization of pulsed solid-state lasers with focus on dispersive systems for temporal stretching and compression of laser pulses (pulse stretcher and pulse compressor) based on a pair of innovative grating waveguide structure (GWS) optical elements. These GWS components will be developed within the framework of the project TRADES. The developed dispersive systems will be implemented in high-power Yb:YAG and Ho:YAG laser systems at the HiLASE Centre (Institute of Physics of the Czech Academy of Sciences). The PhD research will also include the development and optimization of a femtosecond laser systems based on holmium or thulium ions (e.g. Ho:YAP, Ho:YAG, etc.), targeting output power levels of up to 100 W.

The PhD work will include:

- Development of a high-power femtosecond laser source emitting in the 2.0–2.1 µm spectral range with pulse energies of 10–20 mJ.
- Determination and evaluation of a complete set of optical parameters of GWS-based stretcher and compressor systems for the 2 µm laser, and comparison with an equivalent dispersive compressor for a Yb:YAG laser system, including diffraction efficiency, impact on beam quality, grating uniformity, and other relevant characteristics.
- Experimental testing of GWS elements in high-power laser environments under industrially relevant conditions, including comprehensive evaluation of laser performance under these conditions.
- Processing of experimental feedback and presentation of achieved results to TRADES project partners to support further optimization of GWS components.
- Secondment at an industrial and/or scientific partner institution within the TRADES project (e.g. Crytur; IFSW, University of Stuttgart, Germany; Institut Fresnel, France; University of Eastern Finland; etc.).
- Publication activity.

Specific requirements: Master's degree in Physics, Electronics, Materials Science, Photonics and closely related fields, knowledge and experimental skills in lasers and optics, ability to work in team, interest in interdisciplinary research.

FELLOW 13 (FZU HILASE, Prague, Czech Rep.):

Characterization of novel and highly tolerant dispersive devices based on grating-waveguide structures.

The aim of the PhD project is development of characterization tools and laser integration of innovative dispersive GWS (grating waveguide structure) elements. The GWS elements will be developed within the framework of the project TRADES. A specific objective of the PhD project is the design, construction, and commissioning of an experimental station for testing the laser-induced damage threshold (LIDT) of optical components in the 2 μm wavelength region, as well as the development of corresponding testing methodologies, including laser adaptation.

The PhD work will include:

- Design of an LIDT testing system, including appropriate laser modification and integration, development of measurement procedures, and data processing in the 2 μm spectral region.
- Performance of LIDT tests on grating waveguide structures (GWS) in the 1 μm and 2 μm spectral bands (including CW, ns, and ps regimes) at the HiLASE Centre or at partner institutions.
- Complete optical characterization of GWS elements (flatness, diffraction efficiency, etc.).
- Design of a laser system and integration of the characterized gratings into a Yb:YAG thin-disk laser, followed by thorough testing.
- Presentation of feedback and testing results of GWS elements in high-power laser systems to TRADES project partners for further GWS optimization.
- Secondment at an industrial and/or scientific partner institution within the TRADES project (e.g. Crytur, IFSW Stuttgart, Germany; Institut Fresnel, France; University of Eastern Finland, etc.).
- Publication activity.

Specific requirements: Master’s degree in Physics, Electronics, Materials Science, Photonics and closely related fields, knowledge and experimental skills in lasers and optics, ability to work in team, interest in interdisciplinary research.

FELLOW 14 (IOM, Leipzig, Germany):

Advanced Technologies for reactive ion beam etching of pulse compression grating.

In this project, the researcher will investigate an ion beam-based etching process used for the pattern transfer of resist structures into the underlying optical substrate material.

The etching process will be investigated with respect to:

- ion beam parameter optimization to achieve a homogeneous and uniform etching process
- methods for ion beam etching of stress compensation coatings on the rear face of thin optical substrates
- determination of the etch rates for mask and substrate materials (e.g. photoresists, TiO_2, HfO_2, SiO_2) depending of process parameters
- development of etch end-point detection methods
- optimization of the resist pattern transfer process
- simulation and experimental validation of pattern transfer on substrates with the required size.

Specific requirements: Basic knowledge in physics, materials science, optics manufacturing technology. Experience with programming tools, and practical experimentation with vacuum systems and surface characterization techniques.

FELLOW 15 (ULIEGE, Liège, Belgium):

Environmental footprint evaluation of grating waveguide structures in view of their eco-design, including criticality analysis.

PhD candidate number 15 will work transversally on the environmental sustainability of the grating waveguide structures in view of their eco-design, including criticality analysis. This means a close interaction with all PhDs responsible of technological developments, to build representative inventories of the different processes used for GWS manufacturing.

Life cycle assessment will be a key tool to compare different manufacturing routes and to propose eco-design recommendations, as well as the evaluation of the potential environmental gain at the laser level.

A part of the work will also be dedicated to the evaluation of additional indicator in relation with the criticality in terms of raw materials used at the component and system level.

Specific requirements: Masters in engineering, with a background in electronics or physics. The candidate should also have heard about life cycle assessment and environmental impact categories. It is expected from the candidate to be comfortable with social interactions, as contacts with other PhDs will be crucial to get the data.