IHP GmbH -
Leibniz Institute for High Performance Microelectronics/
Leibniz-Institut für innovative Mikroelektronik

Research Associate / PhD Position (m/f/d) in Advanced Analysis Methods for Photonic Devices and Integrated Sensors

Job-ID: 7049/26 | Department: Technology | Salary: as per tarif (TV-L) | Working Time: 40h/week (part-time work option) | Limitation: initially two years with option of extension | Starting Date: as soon as possible

The IHP – Leibniz Institute for High Performance Microelectronics is a leading research institute in the field of silicon-based semiconductor technologies. The institute's research focuses on high-frequency and photonic technologies for applications in communication, sensing, security, and future computing systems. In interdisciplinary teams, we combine excellent research with practical implementation – from technology and design to system-level solutions. IHP employs approximately 400 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25 µm-SiGe-BiCMOS technologies, located in a 1500 m² cleanroom that meets the highest industrial nanotechnology requirements.

Shape the next generation of photonic analysis methods

We are offering a PhD position at the interface of advanced analytical diagnostics, integrated photonics and sensor development within the Diagnostics, Sensors & Emerging Modules (DSE) group.

This position is built around a highly relevant research question:
How can performance bottlenecks, variability effects, and failure-related phenomena in photonic devices and integrated sensor structures be localized, understood, and translated into better designs and better testability?

You will work across two complementary research directions within DSE:

- development of photonic sensor concepts and low-loss silicon nitride (SiN) platforms
- development of advanced analytical and fault-localization methods

A key strength of the role is the close connection between photonic device design, experimental analysis, method development, and ongoing research projects in photonic sensing.

Your research focus

Your PhD will focus on the development of advanced analytical methods for the localization and investigation of performance bottlenecks and failures in photonic devices and integrated sensors.

A particular methodological emphasis lies on laser and optical-based analysis techniques. Starting from methods such as PLS, LVP, LVI, and PEM, you will assess, adapt, and further develop these approaches for photonic applications.

To support this work, you will also design and evaluate dedicated photonic test structures and selected photonic building blocks, for example SiN-based couplers. This creates a direct link between photonic design, experimental validation, and analytical method development.

The position also directly supports ongoing R&D projects in photonic sensing by contributing targeted design capabilities for photonic devices and test structures. In this way, your work will help identify critical bottlenecks in performance, testability, variability, and failure behavior, and feed these insights back into device and technology development.

Research environment

The work is embedded in the DSE group at IHP and carried out in close scientific cooperation with partners at Technische Universität Berlin, in particular with the groups Sensors and Actuators and Security in Telecommunications.

This gives you access to a highly attractive research environment with complementary expertise in:

- photonic sensing
- laser-based and application-oriented analysis
- experimental characterization
- sensor-related demonstrators and advanced test concepts

Your responsibilities

- Develop advanced analytical methods for the localization and investigation of performance bottlenecks and failures in photonic devices and integrated sensor structures
- Adapt and validate laser-based analytical methods for photonic applications, including approaches such as PLS, TLD, LVP, LVI, and PEM
- Design and evaluate dedicated photonic test structures and selected photonic building blocks, for example SiN-based couplers
- Plan, execute, and analyze experiments on photonic components and sensor-related demonstrators
- Investigate performance bottlenecks, testability limitations, technological variability, and failure modes in photonic structures
- Support ongoing research and development projects in photonic sensing through targeted photonic device and test-structure design
- Work in close scientific exchange with cooperation partners at Technische Universität Berlin
- Publish and present your results at conferences and in peer-reviewed journals
- Prepare and complete a PhD thesis in the corresponding research field

Your profile

- Master's degree or diploma in photonics, electrical engineering, physics, or a related discipline
- Very good knowledge of photonic devices or integrated photonics
- Solid understanding of photonic platforms, ideally including SiN-based structures
- Strong interest in analytical methods, experimental characterization, and failure-related investigations
- Experience in photonic simulation, design, or experimental investigation of photonic devices or test structures is an advantage
- Knowledge of laser-based measurement or analysis methods is beneficial
- Background in sensors, semiconductor technology, microfabrication, or related areas is a plus
- Independent, structured, and scientific way of working in an interdisciplinary environment
- Very good English skills, written and spoken

You are also a strong team player. We are looking for a colleague who combines scientific curiosity with analytical thinking, a structured working style, and the ability to collaborate across disciplinary boundaries. You should enjoy working with advanced technical equipment and be motivated to connect method development with practical device and technology questions.

What we offer:

- a PhD topic with strong scientific novelty and practical relevance
- direct involvement in ongoing research projects in photonic sensing
- close collaboration with internal experts and external partners at Technische Universität Berlin
- an interdisciplinary and international research environment
- excellent opportunities for scientific qualification, publications, and conference contributions
- access to modern research infrastructure and industry-relevant technology development
- a structured onboarding process and active support during your integration into the institute

We are committed to supporting your individual development through conference participation, further training, and mentoring opportunities. At the same time, we value the personal needs of our employees by offering flexible working hours, remote work options, and a family-friendly work culture.

IHP is TOTAL E-QUALITY-certified for promoting equal opportunities for women and men in the workplace and is strongly committed to diversity and inclusion. We explicitly encourage women to apply and welcome applications from all individuals regardless of gender, nationality, ethnic or social origin, disability, age, or sexual orientation. Disabled applicants with equal qualifications will be given preference.

If you are relocating to Frankfurt (Oder), our Relocation Service will be happy to assist you with accommodation and settling in.

Further advantages
30 days holiday | special annual payment | Company pension scheme (VBL) | Flexible working hours, also part-time (no core working hours) | Possibility to work up to 40 % independent of location according to company agreement | Parent-child room as a possibility to work with a child in case of childcare bottlenecks | A wide range of further training opportunities in-house or within the framework of business trips | Discounted company ticket with monthly allowance of € 15 for various fare zones | Good transport connections, free parking at the institute | Canteen with breakfast and lunch | On-site health services | Company family and care guides | Free, confidential counselling by an external service provider in a wide variety of challenging private or professional situations, for example on how to reconcile work and family life or in psychosocial emergencies | Structured induction and actively supported integration into the institute (welcome workshop, intercultural workshop, joint leisure activities)

Your application
Have we sparked your interest? Then we look forward to receiving your application via our **online application form.**

For further information regarding the position please contact Dr. Herfurth: career@ihp-microelectronics.com.