Karlsruhe Institute of Technology

3D-Printed Micro-Mechano-Optical Systems

The goal of this PhD project is to explore the vast potential of 3D laser lithography for realizing ultra-compact mechanical systems that can be controlled optical signals. Such systems may, e.g., open entirely new paths towards ultra-compact atomic-force microscopes that can be actuated through an optical fiber or a photonic integrated circuit (PIC) [1]. 3D-printed micro-mechano-optical systems may also be equipped with additional free-form optical structures to offer scanning near-field optical microscopy (SNOM) functionality.

We seek for ambitious candidates with strong interest both in experimental and theoretical aspects of micro-mechano-optical systems as well as the associated manufacturing methods. Your work will comprise the development of the advanced 3D printing techniques that rely on the concept of high-resolution two-photon lithography, the development of device concepts and the design of the associated optical and mechanical micro-structures, as well as the fabrication, characterization and demonstration of functional devices and systems. You will have the opportunity to attend conferences, workshops and summer schools. Engagement in teaching is encouraged.

The following qualifications are required:

- Excellent Master or an equivalent degree in electrical engineering, photonics, physics or related fields.
- Strong theoretical and/or experimental background in optics and nanofabrication, particularly in the field of two-photon polymerization and photonic integration.
- We expect excellent writing and oral communication skills along with the ability to work independently within an international team.

We offer an inspiring, attractive, interdisciplinary, and internationally recognized scientific environment with access to excellent research facilities and a wide scope of advanced training options. The project will be embedded into the prestigious Cluster of Excellence "3D Matter Made to Order", which is jointly funded by KIT and the University of Heidelberg and which pursues a strongly interdisciplinary approach in combining natural and engineering sciences int the field of three-dimensional additive manufacturing technologies. In case of questions, please contact Prof. Christian Koos (christian.koos@kit.edu), Tel. +49 - 721 - 608 42491

Apply through the KSOP PhD application portal with the reference number **KSOP-2020-10**.

[1] Dietrich, P.-I-; Göring, G.; Trappen, M.; Blaicher, M.; Freude, W.; Schimmel, T.; Hölscher, H.; Koos, C.: '3D-Printed Scanning-Probe Microscopes with Integrated Optical Actuation and Read-Out'; Small, 1904695 (2019), https://onlinelibrary.wiley.com/doi/full/10.1002/smll.201904695