Master's Thesis

Hybrid Tunable Aspherical Lens with Integrated Actuator

Gisela and Erwin Sick Chair of Micro-Optics

Prof. Hans Zappe

Research Area
Optical Microsystems

Relevant Tasks
- ☒ Optical experiments
- ☒ Test setup development
- ☒ Device characterization
- ☐ Material characterization
- ☐ Optical simulations
- ☒ FEA simulations
- ☒ Clean room fabrication
- ☒ CAD/CAM
- ☒ Polymer fabrication
- ☐ Programming
- ☐ Analytical analysis / Theory
- ☒ Literature research
- ☐ Teaching

Eligible Departments
- ☒ Microsystems technology
- ☒ Mechanical engineering
- ☒ Process engineering
- ☐ Chemistry
- ☒ Physics
- ☐ Electronics and IT
- ☐ Computer science
- ☐ Industrial engineering

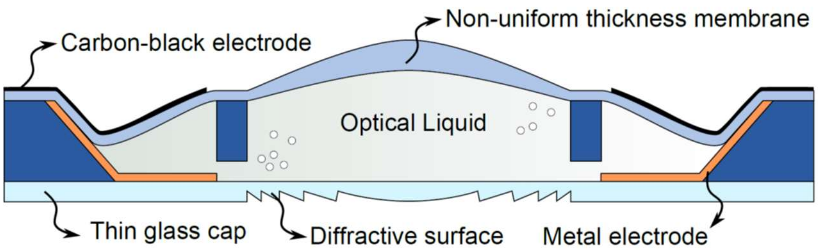
Requirements
Ability to work independently

Basic microfabrication skills
Basic FEA knowledge

Starting Date
Immediately

Contact Person
Dr. Çağlar Ataman
Room: 102 02-075
Tel: 0761/203-7572
caglar.ataman@imtek.de

This project is based on our recent body of work in this field, which originated from the novel method we recently developed to design aspherical liquid-tunable lenses capable of diffraction-limited performance over large focus-tuning ranges. Based on a meniscus-like membrane with a variable thickness, which maintains the desired aspherical profile as the lens is tuned, the new lens concept is simple in structure, yet remarkable in aberration correction performance. In this project, which is part of an ongoing DFG project, we intend to develop an integrated actuator scheme allowing wafer-level manufacturing of electrically-controlled tunable aspherical lenses with additional diffractive surface for chromatic aberration correction.



A conceptual depiction of a hybrid tunable aspherical lens with an integrated electroactive polymer actuator. While this approach is an option, several other actuation techniques will also be explored in the project.

Here is what is expected from the prospective student:

- A series of FEA simulations to explore the performance of various actuation schemes,
- Development of an optimized design using the most promising approach,
- Manufacturing of a proof-of-principle demonstrator together with the PhD student coordinating the project,
- Documentation of the optomechanical performance of the actuator alongside the optical quality of the manufactured demonstrator through extensive experimental characterization.

If you are interested in further information, please contact Dr. Çağlar Ataman.