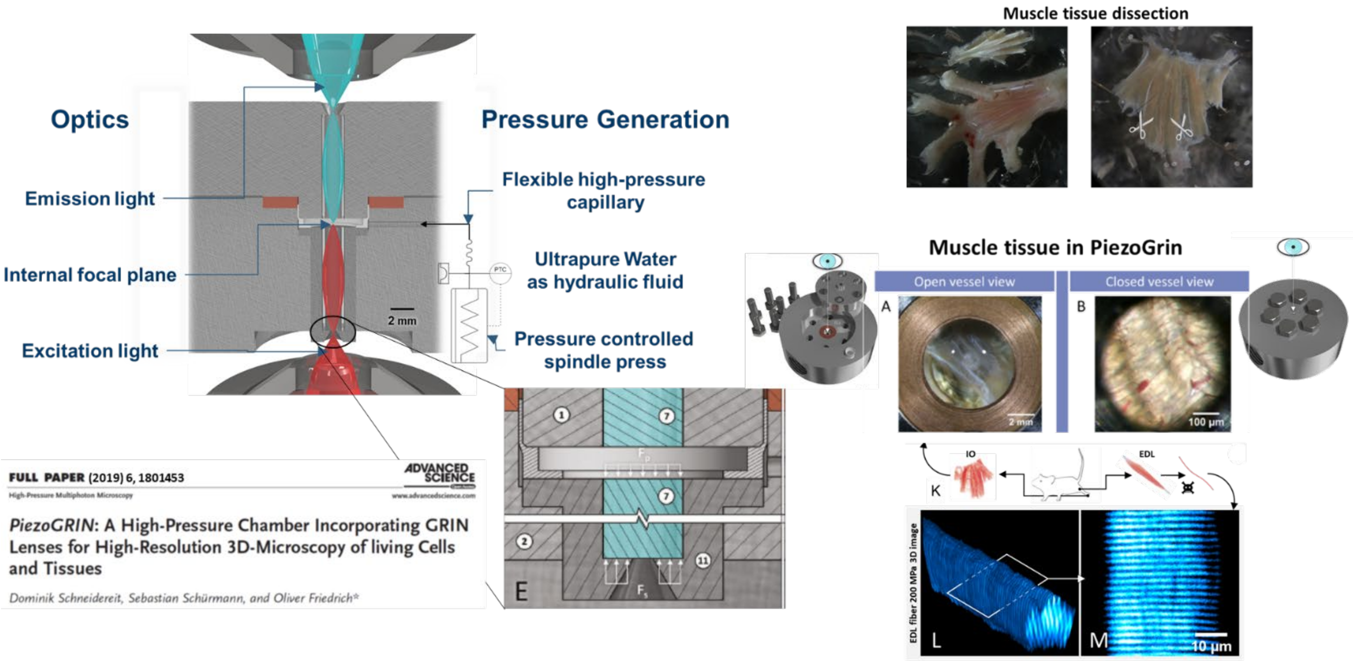
PhD (Dr.-Ing.) Position in High Pressure Bioengineering

Structure-Function Relationships of living Muscle Tissue under High Hydrostatic Pressures using a novel optical PiezoGRIN Technology

The **Institute of Medical Biotechnology** (MBT) at FAU is searching for a highly motivated candidate to fill in **a PhD position** in the fields of Optical Technologies, Advanced Microscopy, High Pressure Biotechnology and Process Engineering. The project follows a DFG-funded research project over three years. It links between optical and mechanical engineering and cellular muscle technologies with the aim to study cellular reactions of skeletal muscle cells and whole tissue subjected to various high hydrostatic pressure (HHP) profiles between 0.1 MPa and ~200 MPa (equivalent to 20,000 m depth).

Most of earth's biosphere is exposed to much higher pressures much than our atmosphere. Life at highly elevated ambient pressures, such as the deep sea, must have evolved in ways to adapt in order to survive such environmental stress on cells and tissues. Some species living in the deep sea can even migrate vertically and cover tens of MPa of pressure gradients in little time. In order to study HHP effects on the locomotory organ of skeletal muscle, we have set aims to expose single cells and whole tissue from terrestrial mammalian origin (i.e., mouse muscles) to HHP in a controlled manner to test whether absolute amplitudes, speed of pressurization, duration at holding pressures and alike, all specifically alter cell and tissue function. For this, we have previously built an optical pressure vessel (PiezoGRIN) to be able to apply high-end multiphoton microscopy to visualise cells and tissue directly under high pressures. With this, cellular Ca^{2+} signals as well as cellular ultrastructure shall be investigated in this project and tested whether small organic osmolyte molecules, i.e., trimethyl-amine-oxide (TMAO), can prevent HHP-induced damage in an attempt to develop a biotechnology concept for 'Life under Pressure'.



Goal: Re-design, engineering of electrical stimulation electrodes into the PiezoGRIN vessel and validation; two-photon imaging of Ca^{2+} signals and *Second Harmonic Generation* (SHG) in single muscle cells and muscle tissue under different HHP profiles

Areas: optical/mechanical/biomedical engineering; High Pressure Biotechnology; Muscle Cell Biology

Background: Knowledge in optical engineering and optics, mechanical and electrical engineering, CAD design

Qualification: Master of Science in fields of engineering (e.g., LSE, MedTech, IEE, MAOT, Mol. Med.)

Salary: PhD: TVL-E13 (75 %)

Start from: **from 1. April 2025. Please send your application as single pdf document to** oliver.friedrich@fau.de, julian.bauer@fau.de

Literature: Schneidereit et al. (2018) Adv Sci 6, 1801453, http://doi.org/10.1002/advs.201801453