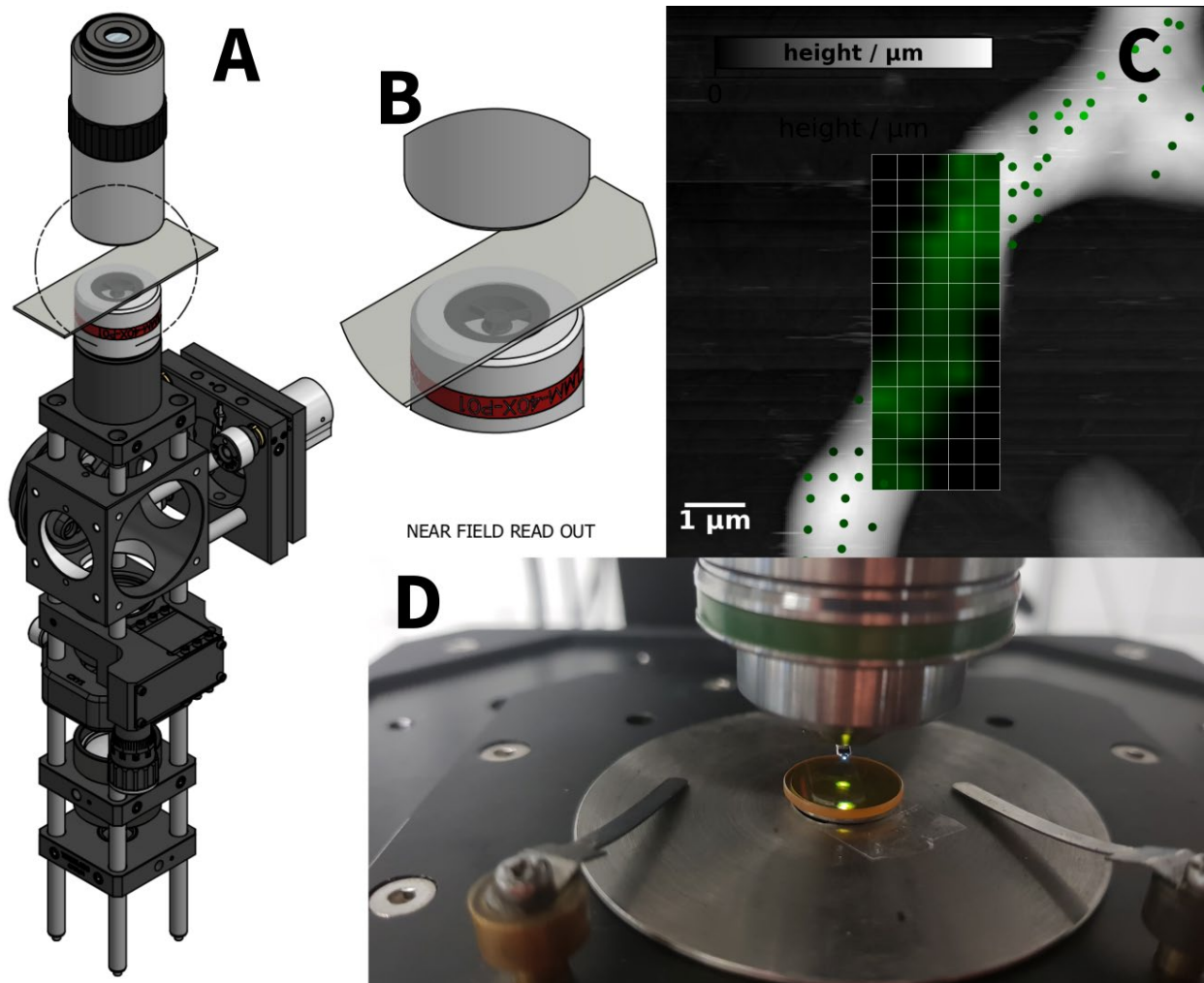


NEXT GENERATION SUPER-RESOLUTION CHEMICAL IMAGING



A) sketch of super resolution imaging system. B) Detail view of confocal read out C) Computational staining of fungal hypha at 100 nm spatial resolution D) Chemical and scanning probe imaging in the same location

Supervisory Team¹

Primary Supervisor: *Bernhard Lendl / TU Wien*

TU Wien project partners: *Ertl, Thurner, Andriotis*

External academic partners: *Prof. Christoph Haisch, TU München, Germany*

¹ The Early Stage Researchers (ESRs) will be accompanied during their thesis by an individual “Thesis Advisory Committee” (TAC), which will guide the ESR through the graduate studies. The TAC will consist of the thesis primary supervisor, and two additional members of the Supervisory Team selected by the ESR.

External industry partners: *Alpes Lasers, Switzerland*

Project Description

This project will focus on new approaches for label-free, super resolution chemical imaging based on mid-infrared photothermal (MIP) indirect spectroscopy. The MIP approach unshackles mid-infrared spectroscopy from the Abbè limit and commonly needed low optical path lengths in aqueous media. Combined with machine learning this approach enables high throughput analysis at the single cell and subcellular level. As MIP is a general-purpose imaging and spectroscopy technique, applications in tissue imaging and on organ-on-a-chip can be investigated within ENROL. Embedded in the Lendl group, this project will be able to benefit of cutting-edge infrared laser technology and a deep understanding of mid-IR spectroscopy and instrument development, while the ENROL framework will provide a multitude of possibilities for collaborations and applications of the MIP technology.

Key Goals and Tasks

Design and construction of a novel, mid-IR laser based set-up for photothermal spectroscopy and imaging below the diffraction limit.

Application of the developed set-ups to a variety of different samples available within ENROL ranging from aqueous solutions, cells to biological materials (bones, joints etc.).

Project-specific Requirements

- Completed master studies in Chemistry, Physics, Photonics, Electrical Engineering or similar
- Experience and skills in spectroscopy, optics, programming/scripting are a plus
- Interest in developing optical setups and experiments
- Enthusiasm for challenging multidisciplinary and interdisciplinary projects
- Willingness to travel to project meetings and scientific conferences.
- Excellent English language skills.
- Personal skills: enthusiasm for team work and collaboration.