School of Biomedical and Precision Engineering
Güterstrasse 24/26, 3008 Bern
Institute for Applied Laser, Photonics and Surface Technologies ALPS
Pestalozzistrasse 20, 3400 Burgdorf

Seminar to Institute for Applied Laser, Photonics and Surface Technologies, Bern University of Applied Sciences, Pestalozzistrasse 20, Burgdorf, Switzerland,

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Shaping ultrafast laser beams for engineering of integrated 3D photonics in bulk and fibre glasses

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Adaptive Optics (AO) is facilitating new forms of laser beam shaping from which novel forms of three-dimensional (3D) nano-structures may be tailored inside of transparent material by ultrashort-pulsed laser interaction. The assembly of tailored nano-diffractive elements into micro-optic diffractive optics presents new opportunities for photonics integration and packaging to serve over a broad range of applications inside of bulk glasses, thin transparent films, and optical fibre. The presentation explores opportunities for integrating multi-functional photonic and opto-fluidic devices into a compact platform of lab-in-fiber (LIF) or fiber cladding photonics that bypass requirements for integration of planar waveguide circuits with fiber optic networks. Alternatively, the 3D laser nano-structuring promises new means for fiber-to-chip packaging with 3D waveguide circuits, for example, the formation of low profile interposers that permit low-loss grating coupling of optical fibers to silicon photonic chips.

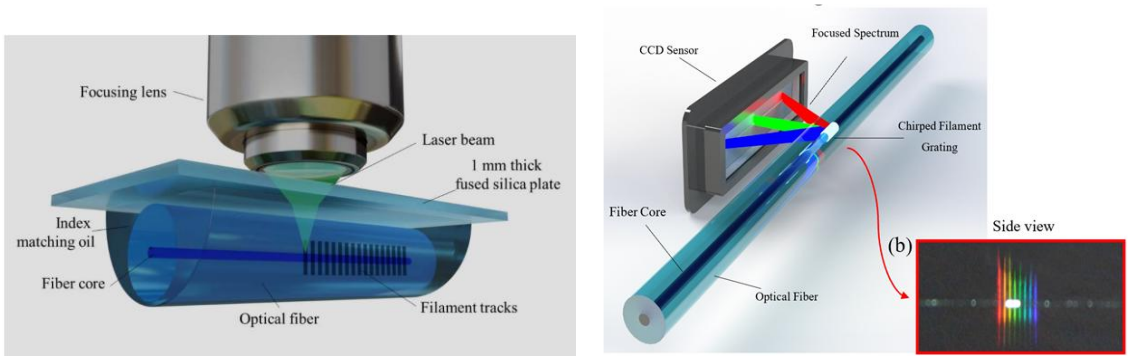

Figure 1. The laser shaping of high-intensity laser filaments and their assembly into a chirped array in the core waveguide of an optical fibre (left) presents an optical antenna for enhancing the radiative scattering of the guided light by self-focussing Bragg diffraction. The fibre Bragg grating defines a compact, lens-free, all-fibre spectrometer (right).

References:
Rahnama, A., et al., Adv. Photonics Res., 1: 2000026. https://doi.org/10.1002/adpr.202000026 (2020)
Rahnama, A., et al., Adv. Optical Mater. 2021, 9, 2100054. https://doi.org/10.1002/adom.202100054

Peter R. Herman Peter R. Herman holds a full professor position in the Department of Electrical and Computer Engineering at the University of Toronto where he guides a large research group in the science and application of laser technology. His group seeks to control and harvest laser interactions in new frontiers of 3-D nanofabrication that emphasizes passive and active lightwave circuits, nano-optics, photonic bandgap and optofluidic devices and their integration into lab-in-a-fiber and lab-in-a-film sensing systems. He is OSA Fellow and has published more than 300 scientific journal and conference papers. More information can be found at: http://photonics.light.utoronto.ca/laserphotonics/

Location:
Bern University of Applied Sciences, Pestalozzistrasse 20, 3400 Burgdorf, Building E, Room E013 (ground floor), location map see: komplett.eps