LABORATORY OF INTEGRATED PHOTONICS AND COMMUNICATION-SENSING SYSTEMS

Faculty of Electrical Engineering and Information Technology

UNIVERSITY OF ŽILINA
Faculty of Electrical Engineering and Information Technology

https://optolab.feit.uniza.sk/

Department of Multimedia and Information-Communication Technology

Who we are?

Daniel Benedikovic is an Associate Professor with an interest in the development of photonic building blocks for quantum, communication, and interconnects applications

Jozef Dubovan is an Assistant Professor with a research focus on stochastic degradation effects in high-speed optical communication systems and networks

Jan Litvik is an Assistant Professor with a research work dedicated to design and optimization of integrated power splitters for next-generation passive optical networks

Michaela Hola is an Assistant Professor with a scientific dedication to the optical waveguide and integrated photonics device design with multiple diversified functions

Milan Dado is a Full Professor with a research direction in optical communications, autonomous vehicle and Internet of Things applications

What we do?

We aim to advance knowledge and innovation in optical communications and integrated photonics through excellence in education, research, and industry collaboration. Our group is committed to:

1) **equipping students with a strong theoretical foundation and hands-on experience in photonics, opto-fiber communications, and photonic device design**
2) **fostering groundbreaking research in high-speed optical networks, silicon photonics, quantum optics, and next-generation photonic systems**
3) **bridging academia and industry by developing transformative technologies that enhance global connectivity, sustainability, and digital transformation**
4) **encouraging cross-disciplinary learning and partnerships in physics, electrical engineering, materials science, and computer science to push the frontiers of optical and photonic technologies**
5) **cultivating a new generation of engineers, scientists, and entrepreneurs with the skills to lead and shape the future of optical communications and integrated photonics**

Education & Teaching

Bachelor degree

- Transmission media (1y., s.)
- Optical communication technology (2y., s.)
- Modeling and simulations (3y., s.)

Master degree

- Optical communication: technology, system and networks (1y., w.)
- Physics of optical communications (1y., s.)
- Physics of optical communications: elaborates (1y., s.)
- Integrated optoelectronics (2y., w.)
- Integrated optoelectronics (2y., w.)

Doctoral degree

- Theory of optical communication systems and networks (1y., s.)
- Theory of fiber and integrated optics (1y., s.)
- Theory of digital signal processing (1y., s.)
- Theory of digital communications (1y., s.)

s. – summer; w. – winter

Advanced training & Hands-on courses

Fostering the place where academic theory meets practical industry needs

Dedicated lectures

Co-operating with experts from academic, scientific and industry domains

Available facilities & tools

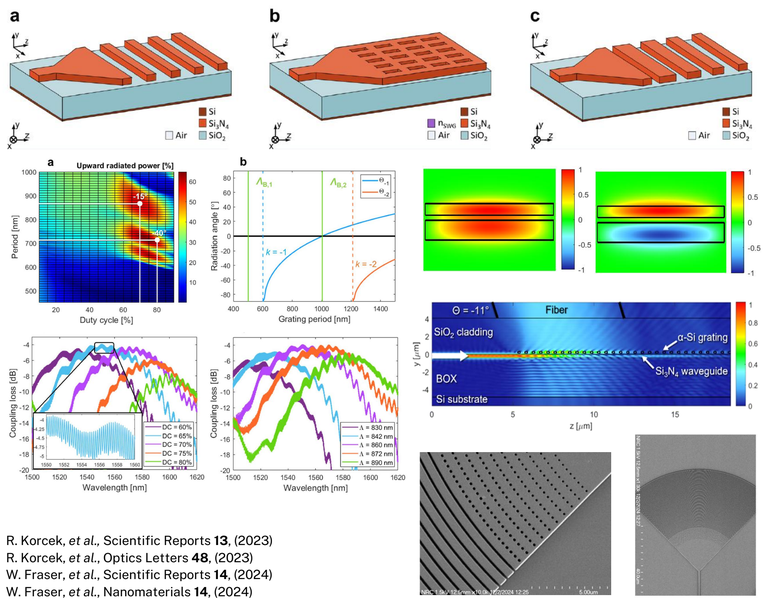
Ansys Lumerical · KLayout · VPIphotonics Design Automation · OptiFDTD Finite-Difference Time-Domain Design Software · Tidy3D · python · MATLAB

Science & Research

Next-generation hybrid opto-fiber and on-chip optical communication systems

Integrated photonics

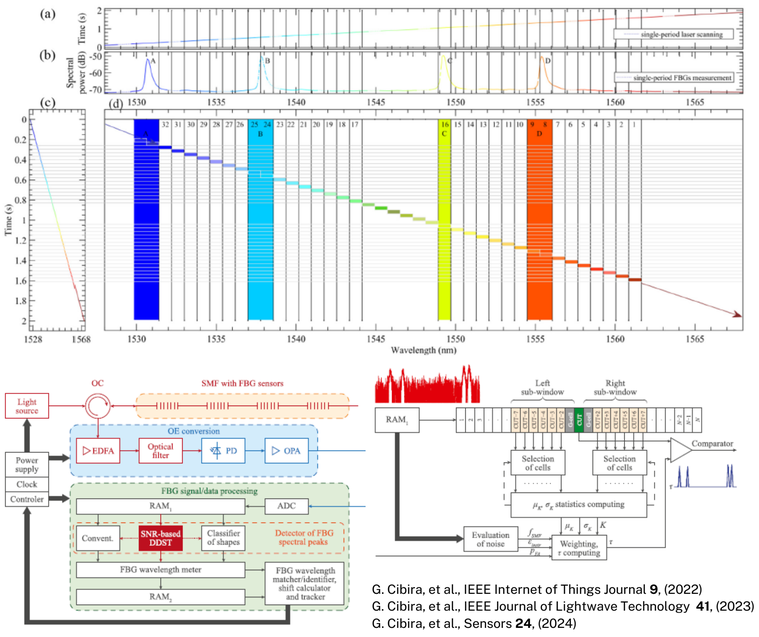
Development of photonic building blocks with advanced functionalities



R. Korcek, *et al.*, Scientific Reports **13**, (2023)
R. Korcek, *et al.*, Optics Letters **48**, (2023)
W. Fraser, *et al.*, Scientific Reports **14**, (2024)
W. Fraser, *et al.*, Nanomaterials **14**, (2024)

Fiber optics

Shared opto-fiber sensing systems and conventional telecom network



G. Cibira, et al., IEEE Internet of Things Journal **9**, (2022)
G. Cibira, et al., IEEE Journal of Lightwave Technology **41**, (2023)
G. Cibira, et al., Sensors **24**, (2024)

Ongoing projects & fundings

Academic & industry collaborations

Carleton University · University of Southampton Optoelectronics Research Centre · Universidad de Málaga · National Research Council Canada NRC·CNRC · cea leti · C2N Centre de Nanosciences et de Nanotechnologies · ANT Applied Nanotools Inc. · T · PROFiber Networking · TESMEDIA

Group success

Slováci hlásia prelom. Vymysleli lacné prepojenie čipov a optických vlákien (rozhovor)

scientific reports

OPEN Library of single-etch silicon nitride grating couplers for low-loss and fabrication-robust fiber-chip interconnection

Optics Letters

Low-loss grating coupler based on inter-layer mode interference in a hybrid silicon nitride platform

Našli spôsob, ako lacno vyriešiť jeden z najväčších problémov vo fotonike. Sú za tým Slováci

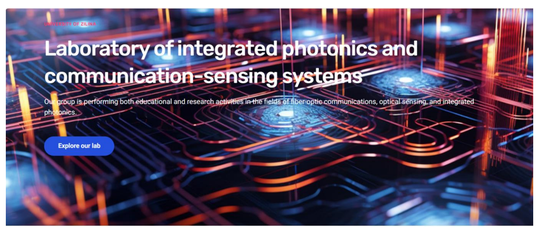
Dynamic Bandwidth Allocation for C-Band Shared FBG Sensing and Telecommunications
Gabriel Cibira, Ivan Glesk, and Jozef Dubovan

SNR-Based Denoising Dynamic Statistical Threshold Detection of FBG Spectral Peaks
Gabriel Cibira, Ivan Glesk, and Jozef Dubovan

Our openings and offerings

PROFESSIONAL SUPERVISION	RESEARCH INTERNSHIPS	INTERNAL UNIZA GRANTS	GRADUATION THESIS
Short-term or mid-term specialization projects			Complex Bachelor (BSc.) and Master (MSc.) projects

Contact us!

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