Development of efficient clad-pumped fiber optical amplifiers for telecommunication systems

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This interdisciplinary project "Development of efficient clad-pumped fiber optical amplifiers for telecommunication systems" (DOPAnT) addresses challenges of developing a new fiber optical amplifier for optical transmission systems. In particular, the focus of this work is on the investigation of Er^{3+}/Yb^{3+} co-doped fiber amplifiers (EYDFAs) pumped with cost-efficient multimode light sources for use in wavelength division multiplexed (WDM) transmission systems to increase optically transparent path length. Riga Technical University Institute of Telecommunication (RTU IT) and Institute of Solid State Physics, University of Latvia (ISSP UL) both in close collaboration with enterprise AFFOC Solutions, Ltd have joined resources and knowledge to achieve the objectives of the project.

In the seminar, all parties involved will talk about their contribution to achieve project goals and present the main results. Members of ISSP UL will inform about tasks that were done at ISSP UL, like the characterization of double-clad Er^{3+}/Yb^{3+} co-doped fiber (SEM measurements, optical microscopy, optical absorption measurements), spectral measurements of multimode LED, simulations of fiber coupler to clarify how pumping radiation is coupled to the active fiber using COMSOL [1, 2]. Experimentally obtained data then were used by partners from RTU IT. The mathematical amplifier model has been created in the VPIphotonics Design Suite software. The main purpose of mathematical modelling is to determine possible gain characteristics and provide baseline values of fiber length and pump parameters for the experimental amplifier setup [3]. To obtain the per-channel gain of the experimental EYDFA, we use the input signal formed by filtering a wideband amplified spontaneous emission (ASE) noise (covering optical C and L bands with a 10-dB bandwidth of 1526–1630 nm) [4]. For pumping a diode centred around 975 nm was used. The wavelength dependence of EYDFA absolute gain and gain uniformity for fiber lengths in the range of 2–7 m has been theoretically and experimentally analysed. As the project approaches its final stage, a field tests of developed EYDFA experimental prototype are performed to validate its applicability for use in fiber optic communication lines.

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