Master Thesis:

Actively Q-switched Er^{3+}:ZBLAN 2.9 µm fiber laser

Erbium doped ZBLAN (Er:ZBLAN) fiber lasers at 2.9 µm have become an object of intense scientific research and an increasingly attractive tool for medical applications. The direct emission at the mid-infrared wavelength without any wavelength conversion stages provides high compactness, good efficiency and high output power levels. So far, an average output power level of 20 W has been reported in continuous wave operation [1] and 12 W in Q-switched operation [2]. In the proposed research study, the objective is the investigation of an actively Q-switched Er:ZBLAN fiber laser with a novel approach for high power operation. The goal of this thesis is the realization of a fiber laser system with high average output power and high pulse energy in the mid-infrared wavelength region.

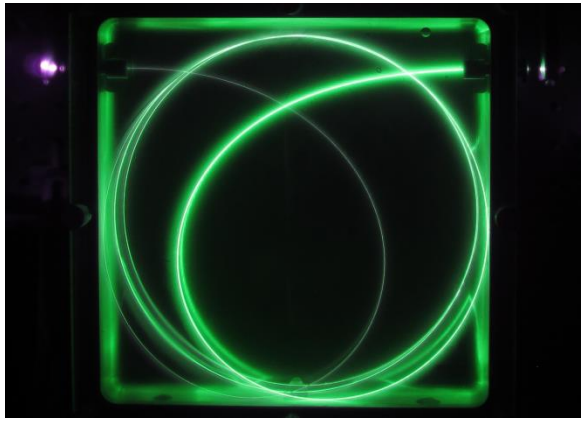

Fig.1: Erbium doped fiber laser with grreen radiation from upconversion

What we offer

The ISL is a multi-disciplinary French-German research laboratory located in Saint-Louis, France. We provide access to all necessary measurement and simulation equipment. Being a bi-national government facility, the applicant has to possess an EU member state citizenship to be eligible for this work.

Your Task

The student has to build up the fiber laser system and characterize its performance (output power, efficiency, pulse energy, pulse duration) in various pumping geometries. A feasibility study for high average output power/ high pulse energy has to be done for future upscaling.

[1] Dominic Faucher, et al., 20W passively cooled single-mode all-fiber laser at 2.8 µm, OPTICS LETTERS, Vol. 36, No. 7

[2] Shigeki Tokita, et al., 12W Q-switched Er:ZBLAN fiber laser at 2.8 µm, OPTICS LETTERS, Vol. 36, No. 15

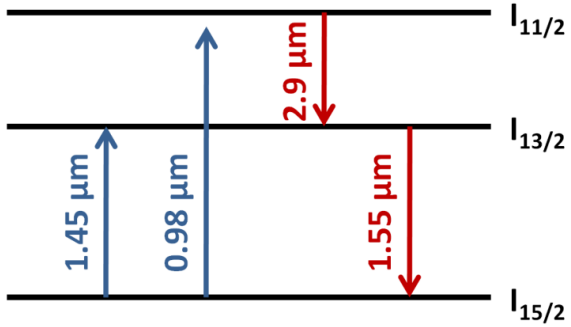

Fig.2 Energy diagram of Erbium-doped materials

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