Lab project / internship M1 PPN (1,5 months)

2022-2023

Title of the project: Fabrication and characterization of Tellurite microspheres for frequency combs sources

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Laboratory / Department / Team : ICB / SAFIR

Summary:

The internship comprises two main components: micro-fabrication and optical characterization. The primary objective of the project is to investigate manufacturing micro-resonators (microspheres and microbottles) made of infrared-transmitting glass fibers and to analyze their optical properties.

The initial phase of the internship will involve using a Vytran filament fusion splicer to manufacture the microspheres by locally heating tellurite glass fibers or capillaries. The focus of this internship will be to determine the influence of various shaping parameters (temperature, heating duration, etc.) on the final geometry of the microbeads (sphericity, diameter). Efforts will be devoted to ensuring that the fabrication process is reproducible.

Subsequently, coupling experiments will be conducted. Infrared laser light will be coupled into the microsphere using a tapered optical fiber positioned in very close proximity and tangentially to its surface, to excite whispering gallery modes (see **Fig. 1**). The characteristics of the resonances will be studied and used to improve the fabrication.

Depending on the progress of the project, additional glass compositions and resonator geometries may be explored, as well as performing nonlinear-optics experiments in the microspheres.



Fig. 1. Experimental setup used for the characterization of the microspheres

Type of project (theory / experiment): experiment

Required skills: knowledge in guided optics and optical materials, precision and conscientiousness.