

# Efficient Nonlinear Fibers for Fiber Optical Parametric Amplifiers

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## INTRODUCTION

Within our modern society we are all continuously requesting more and more capacity in communication systems. Consequently, research within components for future communications systems have, until this point in time, focused on components that secure the possibility of supporting the request for a continued increases in needed capacity.

An important, optical component is the optical amplifier. Based on a demand for capacity, Raman amplifiers and fiber optical parametric amplifiers (FOPAs) that may provide gain at a broader range of wavelengths compared to conventional optical amplifiers based on rare-earth-doped fiber materials, and in addition offer an improved noise performance, are currently very popular. Improved properties are achieved by neglecting the energy efficiency of the amplifiers though.

## OUR PROJECT

In this work we focus on the fiber used in the parametric amplifier, see figure 1. The two important fiber parameters are the nonlinear coefficient and the loss. In general, the higher nonlinear coefficient the better, however materials with a larger nonlinearity also exhibit a larger loss.

We consider various proposals for fibers and use numerical calculations to try and optimize the fiber such that the amplifier requires less energy for the same amplification.

LCA	Materials	Production	Use	Disposal
Materials		x		
Energy			x	
Chemistry				
Other				

Table 1 Life Cycle Check table for the project.

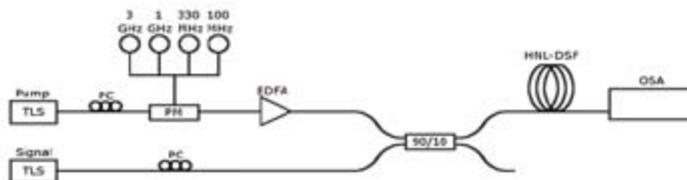


Figure 1 Fiber optical parametric amplifier

## REFERENCES

Hansryd, J. *et al.* (2001). Fiber-Based Optical Parametric Amplifiers and Their Applications, *IEEE J. Sel. Topics Quant. Elec.* 8(3), 1041-1135.