Supercontinuum generation in a 800nm thick ultra-low loss silicon nitride waveguide

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INTRODUCTION

Nonlinear optics has paved the way for many integrated photonics applications including optical communications, sensing, and quantum technology. Among nonlinear effects, supercontinuum generation (SCG) is a key effect in broadening the spectrum of laser pulses over one or more octaves. SCG is therefore essential for applications such as f-2f interferometry [1], optical coherence tomography (OCT), and spectroscopy [2]. Among integrated photonics plateforms, SiN waveguides are currently widely used for their good compatibility with the silicon platform, their high nonlinearity, and their low linear loss. Moreover, SiN has a negligible nonlinear loss in both the visible and near IR ranges.

Here we report SCG over 1.3 octave by pumping with femtosecond pulses at 1550 nm dispersion-engineered ultra-low-loss silicon nitride (SiN) integrated waveguides. Our SiN waveguides were fabricated by CEA LETI using a wafer-scale process to achieve loss as low as a few (specify how much ? 3 dB/m ?) dB/m [3]. Such low loss can compete with the performances obtained with the Damascene process [4]. SiN waveguides were designed with a 800 nm thickness to get a weak anomalous dispersion at 1550 nm. Pumping this SiN waveguide at 1550 nm we obtained a relatively symmetric SC spectrum from ? nm to ? nm, through the combined effects of higher-order soliton compression and dispersive wave generation [5].

References

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