High-confinement gallium nitride-on-sapphire waveguides for integrated nonlinear photonics
- DTU Orbit (31/03/2019)

High-confinement gallium nitride-on-sapphire waveguides for integrated nonlinear photonics
We demonstrate a highly effective nonlinearity of 7.3 W⁻¹m⁻¹ in a high-confinement gallium nitride-on-sapphire waveguide by performing four-wave mixing characterization at telecom wavelengths. Benefitting from a high-index-contrast waveguide layout, we can engineer the device dispersion efficiently and achieve broadband four-wave mixing operation over more than 100 nm. The intrinsic material nonlinearity of gallium nitride is extracted. Furthermore, we fabricate microring resonators with quality factors above 100,000, which will be promising for various nonlinear applications.

General information
State: Published
Organisations: Department of Photonics Engineering, Nanophotonic Devices, Centre of Excellence for Silicon Photonics for Optical Communications, RAS - Ioffe Physico Technical Institute
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Pages: 1064-1067
Publication date: 1 Mar 2019
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 44
Issue number: 5
ISSN (Print): 0146-9592
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.89 SJR 1.79 SNIP 1.597
Web of Science (2017): Impact factor 3.589
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.54 SJR 1.769 SNIP 1.549
Web of Science (2016): Impact factor 3.416
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.53 SJR 2.013 SNIP 1.53
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.86 SJR 2.429 SNIP 1.997
Web of Science (2014): Impact factor 3.292
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.95 SJR 2.441 SNIP 2.058
Web of Science (2013): Impact factor 3.179
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.52 SJR 2.577 SNIP 1.92
Web of Science (2012): Impact factor 3.385
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 3.69 SJR 2.519 SNIP 2.453