A broadband tapered nanocavity for efficient nonclassical light emission

We present the design of a tapered nanocavity, obtained by sandwiching a photonic wire section between a planar gold reflector and a few-period Bragg mirror integrated into the tapered wire. Thanks to its ultrasmall mode volume ($0.71 \lambda^3/n^3$), this hybrid nanocavity largely enhances the spontaneous emission rate of an embedded quantum dot (Purcell factor: 6), while offering a wide operation bandwidth (full-width half-maximum: 20 nm). In addition, the top tapered section shapes the cavity far-field emission into a very directive output beam, with a Gaussian spatial profile. For realistic taper dimensions, a total outcoupling efficiency to a Gaussian beam of 0.8 is predicted. Envisioned applications include bright sources of non-classical states of light, such as widely tunable sources of indistinguishable single photons and polarization-entangled photon pairs.

General information
State: Published
Organisations: Department of Photonics Engineering, Nanophotonics Theory and Signal Processing, Department of Micro- and Nanotechnology, University of Grenoble
Contributors: Gregersen, N., McCutcheon, D., Mørk, J., Gérard, J., Claudon, J.
Pages: 20904-24
Publication date: 2016
Peer-reviewed: Yes

Publication Information
Journal: Optics Express
Volume: 24
Issue number: 18
ISSN (Print): 1094-4087
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 3.74 SJR 1.519 SNIP 1.567
Web of Science (2017): Impact factor 3.356
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.48 SJR 1.532 SNIP 1.544
Web of Science (2016): Impact factor 3.307
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.78 SJR 1.91 SNIP 1.674
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.18 SJR 2.313 SNIP 2.124
Web of Science (2014): Impact factor 3.488
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.38 SJR 2.337 SNIP 2.196
Web of Science (2013): Impact factor 3.525
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.85 SJR 2.562 SNIP 2.108
Web of Science (2012): Impact factor 3.546
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 4.04 SJR 2.58 SNIP 2.572
Web of Science (2011): Impact factor 3.587
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.906 SNIP 2.428
Web of Science (2010): Impact factor 3.753
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.039 SNIP 2.679
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 3.204 SNIP 2.423
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 3.284 SNIP 2.11
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 3.313 SNIP 2.336
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.819 SNIP 2.472
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.669 SNIP 2.217
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.745 SNIP 1.748
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.496 SNIP 1.42
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.98 SNIP 0.761
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.442 SNIP 0.843

Original language: English

Electronic versions:
Gregersen_et_al._2016_A_broadband_tapered_nanocavity_for_efficient_nonclassical_light_emission.pdf

DOI's:
10.1364/OE.24.020904
Source: FindIt
Source-ID: 2342506058

Research output: Research - peer-review › Journal article – Annual report year: 2016