



Improved Coupling to Plasmonic Slot Waveguide via a Resonant Nanoantenna

Andryieuski, Andrei; Zenin, Vladimir A.; Malureanu, Radu; Volkov, Valentyn; Bozhevolnyi, Sergey I.; Lavrinenko, Andrei

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Andryieuski, A., Zenin, V. A., Malureanu, R., Volkov, V., Bozhevolnyi, S. I., & Lavrinenko, A. (2015). *Improved Coupling to Plasmonic Slot Waveguide via a Resonant Nanoantenna*. Abstract from 8th International Conference on Materials for Advanced Technologies, Singapore, Singapore.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Improved Coupling To Plasmonic Slot Waveguide Via A Resonant Nanoantenna

Andrei Andryieuski¹, Vladimir Zenin², Radu Malureanu¹, Valentyn Volkov²,
Sergey I. Bozhevolnyi² and Andrei V. Lavrinenko¹

1) DTU Fotonik, Technical University of Denmark, Oersteds pl. 343, Kongens
Lyngby DK-2800, Denmark

2) Department of Technology and Innovation, University of Southern Denmark,
Niels Bohrs Allé 1, Odense M DK-5230, Denmark

Plasmonic waveguides are considered as a future generation of optical interconnects in integrated circuits for datacom technologies due to their extreme field confinement performance. Inevitably, when using nanoscale waveguides, a new challenge emerges: how to effectively couple the diffraction-limited optical waves into deep-subwavelength plasmonic waveguides.

In this contribution we provide a systematic approach to design, fabricate and characterize an efficient, broadband, and compact dipole antenna nanocoupler for the telecom wavelength range around 1.55 μm . We consider the vertical coupling configuration with a realistic excitation directly from an optical fiber. The scattering-type scanning near-field optical microscope (s-SNOM) characterization allows us not only to make relative comparison of the efficiencies (in terms of the effective area) of different couplers, but also to measure the effective index and propagation length of the slot waveguide mode. All experimental data are in very good correspondence with the numerical simulations. It was also confirmed that the serially connected dipole antennas represent the most efficient and simple design of nanocouplers. We report 26- and 15-fold improvements in the coupling efficiency with two serially connected dipole and modified bow-tie antennas, respectively, as compared to that of the short-circuited waveguide termination. We also emphasize that the s-SNOM-based characterization procedure will become a standard robust technique for the plasmonic waveguide characterization due to its high resolution and reliable measurements.