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C. Dreser[1*], *D. A. Gollmer*[1], *G. Bautista*[2], *X. Zang*[2], *D. P. Kern*[1], *M. Kauranen*[2], *and M. Fleischer*[1]

[1] *Institute for Applied Physics and Center LISA*[+], *Eberhard Karls University Tübingen, Auf der Morgenstelle 10, 72076 Tübingen, Germany*
[2] *Laboratory of Photonics, Tampere University of Technology, Korkeakoulunkatu 3, 33720 Tampere, Finland*
[*] *christoph.dreser@uni-tuebingen.de*

Near-field enhancement and confinement of the electric field of electromagnetic waves are promising features in plasmonics and nanophotonics. Therefore specially designed optical antennas are needed, which have broad applications, for example in surface-enhanced Raman spectroscopy or single molecule detection [1, 2]. Nanocones are well-suited for such applications as they can easily be fabricated and have a very sharp tip with a radius smaller than 10 nm [3]. For an efficient plasmon excitation along the vertical axis the electric field vector of the exciting external electromagnetic wave should have a significant component parallel to the vertical axis [4]. This is only the case for certain laser modes or the illumination of the cones from the side. Therefore the excitation of many cone tips at once under perpendicular incidence is not possible. But for many potential applications it would be beneficial if the electric field of the light was enhanced at the tips of many cones simultaneously.
As a solution for this problem we have introduced a tilt of the cone axis. The asymmetric geometry supports the transformation of a transversal (parallel to the substrate) electric far-field to a longitudinal (perpendicular to the substrate) plasmonic excitation.
The antenna characteristics and the fabrication process will be presented. Spectra obtained by transmission spectroscopy and corresponding simulations will be shown. Furthermore second harmonic generation microscopy of tilted cones with vector beams will be presented [5].

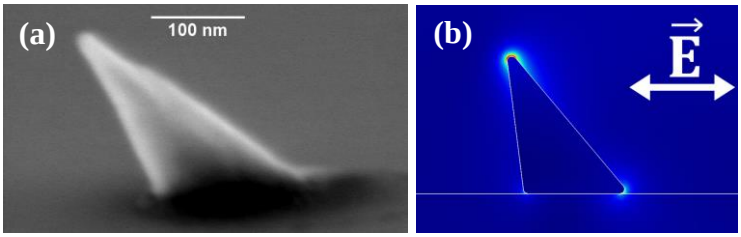

Figure 1. Tilted nanocone, (a) Electron microscopy image, (b) Simulation showing the electric near field

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