ETH zürich

Semester Thesis

Plasmonic Circuits – Faster, Smaller, Greener
- Nanofocusing of Light -

Vision and Future Application
Plasmonic nanofocusing structures opens up unique avenues for faster and smaller detection and light manipulation schemes on the nanoscale. They can confine light into volumes of only a few nm^3, which leads to extreme field enhancements (up to 1000 times).

Type of Work
10% theory, 50% simulation, 40% experiment

Requirements
Interest in working at the cutting edge of research.

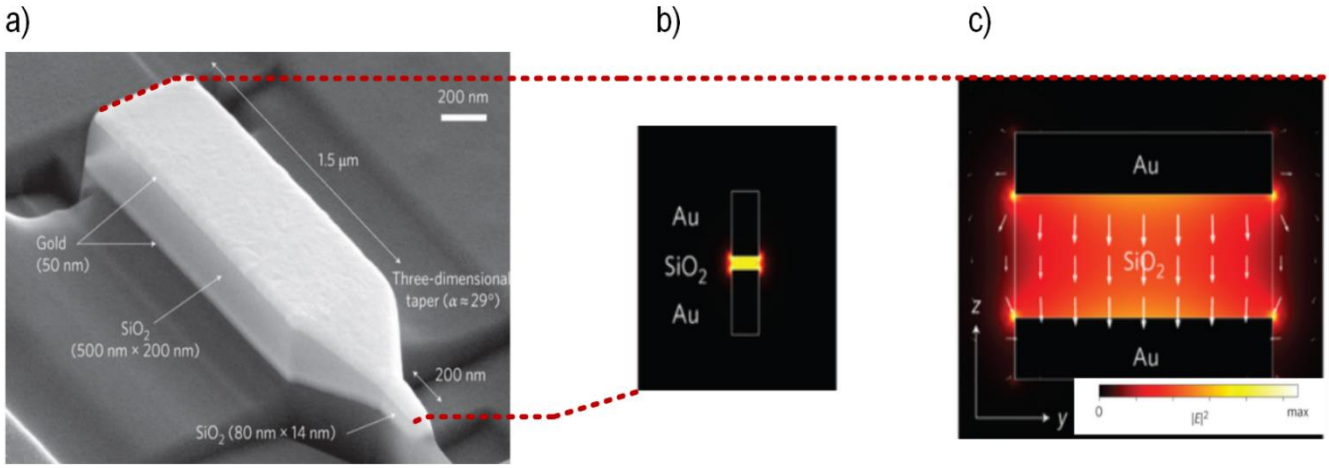

Figure a) SEM image of a fabricated 3D nanofocusing device. **Figure b**) Cross-sectional side views of the E^2 profiles along the *y*-*z*-plane for the small tip (SiO2 80 nm x 14 nm). **Figure c)** Cross-sectional side views of the E^2 profiles along the *y*-*z*-plane for the small tip (SiO2 500 nm x 200 nm).

Choo, H., M.-K. Kim, M. Staffaroni, T. J. Seok, J. Bokor, S. Cabrini, P. J. Schuck, M. C. Wu and E. Yablonovitch (2012). "Nanofocusing in a metal-insulator-metal gap plasmon waveguide with a three-dimensional linear taper." Nat Photon **6**(12): 838-844

Description
The main principles of nanofocusing were formulated over a decade ago. But only recently first experimental verifications of simplest concepts were achieved. In our research we utilize these structures to focus light from photonic (several μm^2) to plasmonic (tens of nm^2) components. The task of this project is to investigate more complex mechanism to improve the efficiency of the focusing process by means of concept development/improvement, simulation and experiments. Our good staff-student ratio allows us to work with you closely and help you to obtain deeper knowledge.

ETH Zurich
Christian Haffner, ETZ K 76
Wolfgang Heni, ETZ K 93
Prof. Dr. Leuthold, ETZ K 81
Gloriastrasse 35
8092 Zurich

Phone: +41 44 632 53 57
Mail: haffnerc@ethz.ch, wheni@ethz.ch

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Institute of Electromagnetic Fields (IEF)