Development of planar Schottky diodes

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***Abstract*— We present the development of an air-bridged planar Schottky diode process at Chalmers University of Technology for use in submillimeter wave mixer and multiplier circuits. As a first step evaluation has been targeted for heterodyne receivers (atmosphere sounders) operation at 340 GHz. The aim is to develop a reliable and repeatable discrete Schottky diode process, with good electrical and mechanical characteristics, which also can be scaled to smaller anodes and extended to integrated diode circuits for THz frequencies.**

Air-bridged Schottky structures were demonstrated in the late 1980's as a reliable, high quality alternative to whisker contacted diodes. This approach gives a mechanically stable structure and still low parasitic capacitances. The Chalmers diode process is based on electron beam lithography, with a beam spot less than 5 nm, which allows for precise anode and airdridge formation. Hence, this process module can also be utilized for submicron size anodes and. terahertz monolithic integrated circuits (TMICs).

Several batches with different shapes of anodes have been fabricated and evaluated with respect to DC/RF-performance. Repeatability of the diode's characteristics indicates good control of the diode fabrication process. We will present the main fabrication route, optimization and repeatability of the diodes as well as RF results from mixer and multiplier measurements up to 340 GHz.

Fig1. Microscopic image of the doubler chip with fabricated at MC2 Chalmers.

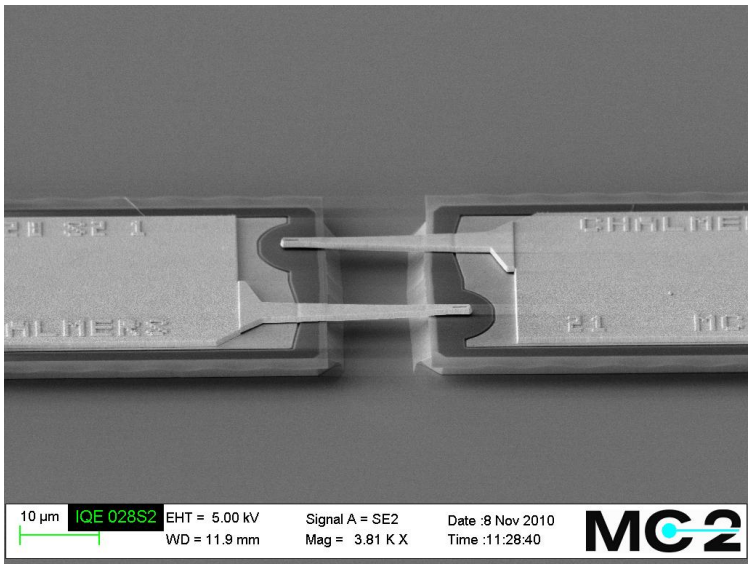

Fig2. SEM image of the antiparallel diodes with the anode area 0.8 µm^2 fabricated at MC2 Chalmers.

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