Master's Thesis Task

In the Program Electrical Engineering and Information Technology

Topic: Development of Back-to-Back Structures for Characterization of Flip-Chip Contacts on InP and InP/SiGe Technology

Task:

The flip-chip bonding technology is a promising method in assembly and interconnection technology for realizing high-frequency transitions in chip architectures. The reason for this is that these transitions are very short in electrical length. Another advantage of this technology is the straightforward implementation of assemblies with different semiconductor technologies (so-called heterointegration concepts). To incorporate the high-frequency behavior of these transitions into the design process of chip assemblies, a method for high-frequency characterization is needed.

In the context of this work, potential concepts for the characterization of flip-chip transitions will be examined. On one hand, a series of back-to-back structures in InP technology will be designed to determine the transmission losses per transition. On the other hand, in the framework of heterointegration concepts with Ruhr University Bochum, SiGe chips have been developed for characterizing the flip-chip transitions in these concepts. The goal is to design InP chips for this back-to-back structure that can be integrated onto the SiGe chips. Additionally, to later characterize the chips in high-frequency metrology, a design for on-chip calibration structures will be required.

The work consists of three parts: the design and creation of a layout for the InP chips, the fabrication of these chips and the back-to-back structures in a cleanroom, and the performance of high-frequency measurements followed by the evaluation of the measurement data.