

# Semester/Master Project

Millimeter Wave Electronics Laboratory, D-ITET  
Prof. Bolognesi

## Development of passivation material in Double-Hetero-junction Bipolar Transistors with Atomic Layer Deposition

### Vision

AlOx deposited with Atomic Layer Deposition has been researched widely as gate dielectrics in various transistors. Recently, MWE group started to use ALD deposited AlOx as passivation material for Base-emitter junction protection against forth-coming chemical attack. The other advantage of having dielectric covering BE mesa is the removal of semiconductor surface defects. Therefore, the quality of deposited thin film, as well as the dielectric-semiconductor interface are of great importance to the device performance.

### Thesis Description

The thesis is mainly focused on cleanroom work. But it can also be adapted should interest arises. As of now, the thesis is designed to consist three parts

- Development of a linear AlOx recipe with ALD in FIRST cleanroom.  
*You will have the opportunity to learn and explore the theory and practice of ALD.*
- Characterization and comparison of AlOx film qualities from different AlOx recipes.  
*You will have the opportunity to study Ellipsometry and optimize the model for as-deposited AlOx*
- (Optional) Characterization of the interface quality between AlOx and DHBTs base material through RF C-V measurement of MOS capacitor.  
*You will have the opportunity to participate in AlOx-GaAsSb MOS capacitor process development, and its C-V characterization with Keithley Semiconductor Parameter Analyser.*



Cut away of a heterostructure bipolar transistor working at 700GHz

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