Motivation:
A key component for transmitter design is the power amplifier (PA) as last stage of a Tx frontend. This PA is responsible for the power generation for long distance communication or radar applications. For high frequency devices the possible output power is limited by the breakdown behavior of the transistors, which is divided by the band gap of the used semiconductor technology. An interesting material for high frequency power amplifier is GaN, due to its large breakdown voltage and high fmax. IMS Chips is able to produce GaN Transistor with adjustable threshold voltage. This allows for different power amplifier topologies. In order to use the GaN technology modeling of the devices is needed, in order to design PA.

Goals:
• Investigation of the IMS GaN technology with different gate/threshold voltage variation
• Modelling a ready to use GaN component library in ADS with active and passive components.
• Design of different high power amplifiers with different threshold voltage behavior

Tasks:
• Investigation of the IMS GaN technology with different gate/threshold voltage variation
• Designing and comparing a usable transmission line topology in the IMS GaN technology
• Modelling RF components (active and passive) in the IMS GaN technology in ADS
• Designing a power amplifier in the investigated IMS GaN technology

Small-signal 18-element AlGaN/GaN HEMT equivalent circuit

Schematic of RF device manufacturing steps on AlGaN/GaN and InAlN/GaN wafers.