



Master-Arbeit

Growth of III-nitride semiconductors with magnetron sputter epitaxy

In collaboration with the Fraunhofer FEP the Institute of Solid State Electronics is developing a new variety of magnetron sputtering to expand its use in semiconductor manufacturing.

As electrification drives the demand for better power electronics, III-nitride semiconductors like AlN and GaN have established themselves as an alternative to Si based devices. However, established epitaxy processes for these materials require high growth temperatures and have high operating cost. Magnetron sputter epitaxy could become a low-cost alternative to these processes.

The aim of this work is to optimize the growth conditions for AlN and GaN using magnetron sputter epitaxy on Si and sapphire substrates. A special emphasis is placed on growth at low temperatures and at high rates suitable for high-volume manufacturing. Optimizing the growth will also involve an in-depth characterization of the films to assess their suitability for device manufacturing.

Provided that the experiments are successful, the results will be submitted for publication in a scientific journal.

Tasks

- Growth of AlN and GaN using magnetron sputter epitaxy
- Investigation of different substrate pre-treatment approaches
- Optimization of growth conditions for growth at low temperatures and high rates
- Characterization of the grown films with techniques like XRD and AFM

Associated Professor

Prof. Dr. Elizabeth von Hauff

Supervisor and Contact

Dr. A. M. Hinz

Günther-Landgraf-Bau, Raum 1-E09,

E-Mail: alexander_martin.hinz@tu-dresden.de