

III-Nitrides Substrates and Defect Characterization in Nitride Materials for Power Devices

Elke Meissner

Fraunhofer Institute for Integrated Systems and Device Technology, Erlangen, Germany

The performance and reliability of an electrical device is decisive for its application and wider usage. Novel devices often show an outstanding performance in laboratory environment but have to survive field conditions and perform free of failure for a long time. If a failure of the device occurs, the origin has to be identified and may have various causes ranging from materials defects over processing issues, packaging problems and others. This tutorial will pick up this topic from a materials point of view and will discuss what defects in the materials are considered relevant for the electrical function of a nitride device and how such materials defects can be analyzed. Thereby, materials issues in the substrates starting from crystal growth of GaN and AlN will be discussed as well as defects in epitaxial layers for device structures. The tutorial points out a possible methodology how to identify key defects in nitride materials with respect to the performance of a power device.