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Title:Progress in group III nitride semiconductor electronic devices

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Abstract:Recently there has been a rapid domestic development in group III nitride semiconductor electronic materials and devices. This paper reviews the important progress in GaN-based wide bandgap microelectronic materials and devices in the Key Program of the National Natural Science Foundation of China, which focuses on the research of the fundamental physical mechanisms of group III nitride semiconductor electronic materials and devices with the aim to enhance the crystal quality and electric performance of GaN-based electronic materials, develop new GaN heterostructures, and eventually achieve high performance GaN microwave power devices. Some remarkable progresses achieved in the program will be introduced, including those in GaN high electron mobility transistors (HEMTs) and metal - oxide - semiconductor high electron mobility transistors (MOSHEMTs) with novel high-k gate insulators, and material growth, defect analysis and material properties of InAlN/GaN heterostructures and HEMT fabrication, and quantum transport and spintronic properties of GaN-based heterostructures, and high-electric-field electron transport properties of GaN material and GaN Gunn devices used in terahertz sources. © 2012 Chinese Institute of Electronics.

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