

NANOSTRUCTURES CREATED BY METAL ORGANIC VAPOUR PHASE EPITAXY

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Abstract

Light Emitting Diodes (LED), laser and high speed and high power transistor play an important role in today life and help serving megatrends such as health, safety, communication, energy and therefore sustainable economic growth. Nanostructures based on III/V-compound semiconductor such as GaAs and GaN serve as a core technology for these applications. The Metal Organic Chemical Vapour Deposition (MOCVD) allows the production of these sophisticated devices on industrial scale. To address the challenges we developed a Planetary Reactor for 5x200 mm GaN-on-Si applications as well as a Showerhead Reactor for 19x4 inch wafer. Advanced process control and yield improvement using metrology tools play a significant role to achieve the required production quality. LED growth serves as example to explain physical dependencies and reactor design considerations for production type reactors. This paper also discusses the different developments in the field of MOCVD to facilitate further reduction in production cost and simultaneously improve the device characteristics by using nanostructures such as nanowires. Looking at wafer bow of 200 mm wafer, temperature distribution in the reactor, photoluminescence mapping across the full wafer and high resolution XRD data helps to understand the effect of growth temperature and gas flow on the properties of the nanostructures.

Keywords: Metalorganic vapour phase epitaxy, compound semiconductor, light emitting diodes

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