

O 37: Prize Talk Dadgar (Gaede Prize)

Time: Wednesday 14:00–14:45

Location: H36

Prize Talk

O 37.1 Wed 14:00 H36

Gallium-Nitride-on-Silicon: Mission possible! — •ARMIN DADGAR — Institut für Experimentelle Physik, Fakultät für Naturwissenschaften, Otto-von-Guericke-Universität Magdeburg and AZ-ZURRO Semiconductors AG, Universitätsplatz 2, 39106 Magdeburg

In comparably short time, Gallium-Nitride has developed from an unrulable material in the mid eighties to one of the most important compound semiconductors, starting with first commercial blue LEDs in 1992 to lasers for HD-DVD and Blue-Ray DVD. Main disadvantage is the lack of suited high-quality substrates. Nowadays, only expensive pseudo-substrates are available used mainly for the growth of laser structures. Therefore, LEDs as well as high-performance electronics

are grown on sapphire or SiC. Attempts to grow GaN on cheap Si substrates by metalorganic vapor phase epitaxy failed due to the unfavorable thermal expansion, which leads to cracking even for thin layers. At this time, many experts assumed that it is in principle impossible to solve this problem. This viewpoint had to be revised when we showed in 2000 that the thermal incompatibility strain is well controllable and several micron thick, crack-free GaN layers can be grown on silicon. We will present sources of strain in heteroepitaxy and how, by using strain-engineering methods, flat large diameter GaN-on-Si wafers for device applications can be obtained. Additionally, we show examples of application fields where the material combination as well as the lower cost are advantageous for GaN-on-Si.