TM-P055

Optimization of μc-SiGe:H Layer for a Bottom Cell Application

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Many research groups have studied tandem or multi-junction cells to overcome this low efficiency and degradation. In multi-junction cells, band-gap engineering of each absorb layer is needed to absorb the light at various wavelengths efficiently. Various absorption layers can be formed using multi-junctions, such as hydrogenated amorphous silicon carbide (a-SiC:H), amorphous silicon germanium (a-SiGe:H) and microcrystalline silicon (μc-Si:H), etc. Among them, μc-Si:H is the bottom absorber material because it has a low band-gap and does not exhibit light-induced degradation like amorphous silicon. Nevertheless, μc-Si:H requires a much thicker material (>2 mm) to absorb sufficient light due to its smaller light absorption coefficient, highlighting the need for a high growth rate for productivity. μc-SiGe:H has a much higher absorption coefficient than μc-Si:H at the low energy wavelength, meaning that the thickness of the absorption layer can be decreased to less than half that of μc-Si:H. μc-SiGe:H films were prepared using 40 MHz very high frequency PECVD method at 1 Torr. SiH4 and GeH4 were used as a reactive gas and H2 was used as a dilution gas. In this study, the μc-SiGe:H layer for triple solar cells applications was performed to optimize the film properties.

Keywords: multi-junction cells, μc-SiGe:H, PECVD

TM-P056

Study of n-ZnO/InGaN/p-GaN Lihgt Emitting Diodes

강창모, 남승용, 공득조, 최상배, 성원석, 이동선
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Lighting emitting diodes of n-ZnO/MQW/p-GaN structure are fabricated and investigated. To realize this LED structure, n-ZnO/MQW/p-GaN are grown by MOCVD. At several bias voltages, blue-green light is emitted from the ZnO mesa edge. However, the emission is restricted near the mesa edge. It is seen that the hole current does not spread well. It is because conductivity of p-GaN is extremely small. The break down voltage of the device is small compared to conventional InGaN/GaN LEDs. It is seen that ZnO columnar grain boundaries act as leakage current paths and non-radiative recombination center.

Keywords: ZnO, GaN, LEDs