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(54) **GALLIUM NITRIDE MATERIAL STRUCTURES INCLUDING SUBSTRATES AND METHODS ASSOCIATED WITH THE SAME**

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(21) Appl. No.: **11/121,793**

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(58) **Field of Classification Search** ..... 257/189,  
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See application file for complete search history.

(57) **ABSTRACT**

(56) **References Cited**

Gallium nitride material-based semiconductor structures are provided. In some embodiments, the structures include a composite substrate over which a gallium nitride material region is formed. The gallium nitride material structures may include additional features, such as strain-absorbing layers and/or transition layers, which also promote favorable stress conditions. The reduction in stresses may reduce defect formation and cracking in the gallium nitride material region, as well as reducing warpage of the overall structure. The gallium nitride material-based semiconductor structures may be used in a variety of applications such as transistors (e.g. FETs) Schottky diodes, light emitting diodes, laser diodes, SAW devices, and sensors, amongst others devices.

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**19 Claims, 4 Drawing Sheets**

