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## OPTICAL SECOND HARMONIC GENERATION IN GaN WAVEGUIDE STRUCTURE

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To create modal phase matching, most common approach is to use periodic poling structure, which can be troubling to manufacture. Our research investigates attractive all *GaN* based structure with modal phase matching second harmonic generation abilities. Our goal was to grow second-harmonic generator (SHG) *N*-polar *GaN*/*Al*<sub>2</sub>*O*<sub>3</sub>/*Ga*-polar *GaN*/*AlGa**N*/*AlN*/*Sapphire* using metal-organic chemical vapor deposition (MOCVD) technique for *Nd* : *YAG* lasers. For our theoretical model main variable was width of *GaN* layers. The waveguide structure of 507nm *Ga*-polar and 91nm *N*-polar *GaN* sandwich, separated by 20nm atomic layer deposition (ALD) of an *Al*<sub>2</sub>*O*<sub>3</sub> layer was grown on sapphire and 420nm *AlGa**N* epilayer. Structure was tested using endfire method with femtosecond laser and peak conversion was observed around 1080nm. In conclusion by changing widths of *GaN* layers, this structure SHG can be used for tunable spectrum second-harmonic generation, but more research and fine tuning is required