

## Semiconductor Variable Wavelength Generator of Near-Infrared-to-Terahertz Regions

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**Abstract :** Power characteristics are obtained for laser beams of near-infrared and terahertz wavelengths when produced by difference-frequency generation with a quasi-phase-matched (QPM) waveguide made of gallium phosphide (GaP). A refractive-index change of the QPM GaP waveguide is included in computations with Sellmeier's formula for varying input wavelengths, where optical loss is also included. Although the output power decreases with decreasing photon energy as the beam wavelength changes from near-infrared to terahertz wavelengths, the beam generation with such greatly different wavelengths, which is not achievable with an ordinary laser diode without the replacement of semiconductor material with a different bandgap one, can be made with the same semiconductor (GaP) by changing the QPM period, where a way of changing the period is provided.

**Keywords :** difference-frequency generation, gallium phosphide, quasi-phase-matching, waveguide

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