298

Accession number:20114214444703

Title:Production of orientation-patterned GaP templates using wafer fusion techniques

Authors:Termkoa, Krongtip (1); Vangala, Shivashankar (1); Goodhue, William (1); Peterson, Rita (2); Bedford, Robert (2); Tassev, Vladimir (3); Lynch, Candace (3); Bliss, David (3)

Author affiliation:(1) Photonics Center, University of Massachusetts Lowell, Lowell, MA 01854, United States; (2) Air Force Research Laboratory, Wright Patterson AFB, OH 45433, United States; (3) Air Force Research Laboratory, Hanscom AFB, MA 01731, United States

Corresponding author:Vangala, S.(shivashankar_vangala@uml.edu)

Source title:Optical Materials

Abbreviated source title:Opt Mater

Volume:34

Issue:1

Issue date:November 2011

Publication year:2011

Pages:30-35

Language:English

ISSN:09253467

CODEN:OMATET

Document type:Journal article (JA)

Publisher:Elsevier, P.O. Box 211, Amsterdam, 1000 AE, Netherlands

Abstract:Nonlinear optical frequency conversion is an effective technique for generating infrared (IR) and terahertz (THz) wavelengths not readily available from existing laser sources. Birefringent materials such as LiNbO3 are often used to generate wavelengths where gaps exist, but are unsuitable in the mid-IR, far-IR, and THz regions as these materials are often opaque in these regions. As an alternative, GaAs has been employed for frequency conversion in these regions using quasi-phase-matching (QPM) to overcome the material's lack of birefringence. QPM has been successfully demonstrated in GaAs using fused stacks of thin alternately oriented layers or inverted orientation patterned (OP) grating templates overgrown with thick columnar GaAs layers. Although GaAs has a high nonlinear coefficient d14 = 170 pm/V at 1.064 um and good thermal conductivity (52 W/m K), it suffers from strong two-photon absorption below 1.7 um making it inefficient when pumped with a source less than or equal to this wavelength. GaP also has a high nonlinear coefficient d14 = 71 pm/V at 1.064 um, better thermal conductivity (110 W/m K) and much lower two-photon absorption in the 1 um region. Therefore, OPGaP is desirable for NLO applications in the mid-IR and THz that use commercially available pump lasers in the 1.06-1.55 um wavelength range. In this work the fabrication of OPGaP templates suitable for thick columnar hydride vapor phase epitaxial growth of GaP is reported using a commercially viable wafer fusion technique.

Number of references:22