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器件制备及器件物理

利用亚波长矩形金属光栅稳定980 nm高功率垂直腔面发射激光器偏振

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摘要： 利用亚波长矩形金属光栅的偏振特性,在垂直腔面发射激光器的有源区引入各向异性增益从而达到控制其偏振的目的。光栅参数设计基于均匀介质理论和抗反射理论,光栅设计周期为186 nm,占空比为0.5,并且光栅制作于GaAs盖层来对TE偏振光提供额外的反射率。经过设计分析对p-DBRs的对数进行了缩减,并且将光栅条之间的盖层区域刻蚀掉,刻蚀深度为1 μm左右。盖层刻蚀的结果使电流注入的方向严格沿着光栅条线性注入的有源区,从而增加了非均匀增益并提高了偏振比。通过多物理场有限元分析软件对器件进行了模拟分析,结果基本上符合设计要求。通过优化工艺步骤,最终得到了550 μm孔径器件的输出功率为780 mW,并且偏振比达到4.8的结果。

关键词： 垂直腔面发射激光器 金属光栅 偏振控制

Stable Polarization Control of 980 nm High-power Vertical-cavity Surface-emitting Lasers Using Sub-wavelength Rectangular-metal-gratings

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Abstract: The polarization control of vertical-cavity surface-emitting lasers with high power emission is demonstrated by using metal-grating to import non-isotropic gain. The grating with a period of 186 nm and a duty ratio of 0.5 was fabricated on the GaAs-cap layer to provide additional reflectance for TE polarization. The pairs of p-DBRs were reduced and the GaAs-cap between grating stripes was etched to force the current to be injected linearly along grating stripes to realize the maximum non-isotropic gain. A polarization ratio of 4.8, an output power of 780 mW and high temperature performance were demonstrated for a 550 μm aperture device. Key words : vertical-cavity surface-emitting laser; metal-grating; polarization controlling CLC number: TN248.4 Document code: A

Keywords: vertical-cavity surface-emitting laser metal-grating polarization controlling

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