Devices for optical communications

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Coupled with the rapid emergence of lightwave communications, there has been a growing research and development effort on optical devices. Research interest is expanding from devices compatible with multimode fibers to those compatible with single-mode fibers, and from devices operating in the 0.8 μm region of the spectrum to devices capable of operating in the long-wavelength region near 1.3 and 1.6 μm. Important issues in improving first-generatoin devices include laser degradation and the operating life of lasers, yield, stability and self-pulsations of lasers. One goal of work on second-generation devices is to make available single-transverse-mode lasers compatible with single-mode fibers. Another goal is to provide source and detector options for the long-wavelength systems where fiber properties are more favorable. GaAlAs and Si materials are no longer suitable for these wavelengths, but considerable success with new materials such as InGaAsP and InGaAs has already been attained.

A comparison will be made of the methods of epitaxial growth employed to prepare the heterostructures required for junction lasers and detectors, including liquid-phase epitaxy, molecular beam epitaxy and vapour-phase epitaxy. In addition, we will review the basic characteristics of the new device materials, and of various new structures for single-mode lasers and detectors.

光 通 信 器 件

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随着光波通信的迅速出现，对光学器件的研究和发展日益增长。研究对象已从多模光纤器件扩展到单模光纤器件，工作波长也已从0.80微米移向1.3和1.6微米的长波段。改进第一代器件所遇到的重要问题包括激光器的劣化、激光器工作寿命、增益、稳定性和激光器的自脉冲现象。第二代器件的目标是制作与单模光纤相配合的单横模激光器，另一个目标则是为长波光纤准备可供选择的激光器和探测器，因为在长波段光纤的性质更为有利。对于这些波长，GaAlAs和Si材料不再适用，现使用InGaAs等新材料已经获得相当多的成果。

比较了制备结型激光器和探测器所需的异质结所使用的各种外延生长方法，包括液相外延(LPE)、分子束外延(MBE)和气相外延(VPE)。此外，我们还将对新的器件材料以及各种单模激光器和探测器新结构的基本特性进行评述。