

A GaAs/GaAlAs PNP negative-resistance laser with low threshold current

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A PNP type negative-resistance laser has been obtained with the following heterojunction structure: $n\cdot\text{GaAs}/N\cdot\text{Ga}_{1-x}\text{Al}_x\text{As}/P\cdot\text{GaAs}/P\cdot\text{Ga}_{1-y}\text{Al}_y\text{As}/P\cdot\text{GaAs}/n\cdot\text{GaAs}/P\cdot\text{Ga}_{1-z}\text{Al}_z\text{As}$, where $x=0.2-0.3$, $y\leq 0.2$, $z\sim 0.1$. The operation mechanism and the process technology of this type of device are discussed. The condition for "on" turning is analyzed and some electrical parameters and stimulated emission characteristics of the device are measured. These devices have a turn-on voltage of about 15–20V, and the stand-on current is about 10–100 mA, while the corresponding stand-on voltage is about 1.5V. The lowest threshold current density is about 2500 A/cm². Stimulated emission by self-oscillation may easily be realized when the device is connected in a simple relaxation circuit.

低阈值 GaAs/GaAlAs PNP 负阻激光器

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我们研制成一种 PNP 型异质结负阻激光器。器件结构为： $n\cdot\text{GaAs}/N\cdot\text{Ga}_{1-x}\text{Al}_x\text{As}/p\cdot\text{GaAs}/P\cdot\text{Ga}_{1-y}\text{Al}_y\text{As}/p\cdot\text{GaAs}/n\cdot\text{GaAs}/P\cdot\text{Ga}_{1-z}\text{Al}_z\text{As}$ ；其中， $x=0.2\sim 0.3$ ， $y\leq 0.2$ ， $z\sim 0.1$ 。本文研究了这种激光器的工作原理和制备工艺，分析了存在异质结构时器件的电导通机理，测量了器件的某些电参数及激射特性。器件的转折电压 V_s 为 15~20V，维持电压 V_H 约为 1.5V，维持电流 I_H 约为 10~100mA。激射阈电流密度最低可达 2500A/cm²。将激光器置于简单的张弛振荡线路中能够较容易地实现自振激射。