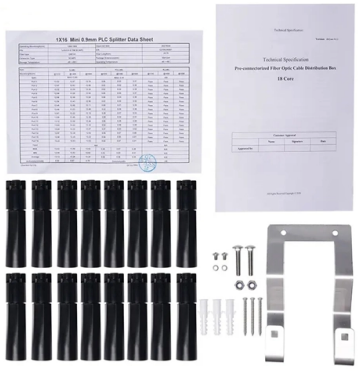
# Construction Principle of Laser Diode



## Summary of Content

A laser diode is constructed as a semiconductor p-n junction with an active region sandwiched between n-type and p-type layers, forming a resonant cavity that enables stimulated emission of coherent light.

Basic Structure

A laser diode is a semiconductor device that converts electrical energy into coherent light through stimulated emission. It typically consists of:

• N-type layer: Provides electrons as charge carriers.

• P-type layer: Provides holes as charge carriers.

• Active region (intrinsic layer): A thin semiconductor layer, often made of InGaAs or GaAs, where electrons and holes recombine to emit photons. This region is also called the enhancement medium because it amplifies light through stimulated emission . The active region is positioned between the n-type and p-type layers, and metal contacts are attached to these layers to allow forward biasing of the diode, which injects carriers into the active region .

Resonant Cavity and Mirrors

The laser diode includes a resonant optical cavity formed by polishing or coating the opposite faces of the semiconductor crystal. One mirror is fully reflective, and the other is partially reflective, allowing photons to bounce back and forth, stimulating further emission and producing a coherent, monochromatic laser beam . This cavity ensures that the emitted light is highly focused and coherent, with photons in the same phase and frequency .

## Article Content

Laser Diode

Laser diodes work when electron-hole recombination takes place inside a p-n junction, resulting in the stimulated

Laser Diode Construction, Working and Its Applications

The above figure shows a simplified construction of a laser diode, which is similar to a light emitting diode (LED). It uses gallium

Laser Diode

Laser diode similar to LED is used for producing light but the light is coherent and focused at a small point. It was invented by

Laser diode

Unlike a regular diode, the goal for a laser diode is to recombine all carriers in the I region, and produce light. Thus, laser diodes are

What is Laser Diode?

The laser diode works on the principle that every atom in its excited state can emit photons if electrons at higher energy level are

Laser Diode : Construction, Types, Working & Its Applications

A Laser Diode is a p-n junction diode that emits laser radiation once the current is applied in forward direction. These

Semiconductor Laser: Construction, Working Principle, Diagram ...

A semiconductor laser, also called a laser diode, consists of a forward-biased p–n junction in gallium arsenide (GaAs). Electrons and

Laser Diode

Laser diode operates on the principle of stimulated emission, amplifying light within a resonant cavity. Laser diodes

Laser Diode: Working Principle, Construction, Types, Application

To operate, laser diodes must induce photon emission at a semiconductor junction. Emissions from a laser diode can

Laser Diode: Working Principle, Diagram & Applications

Construction and Principle The core structure of a laser diode relies on a p-n junction formed from doped semiconductor materials,

Laser Diode

A Laser Diode is a p-n junction diode that emits laser radiation once the current is applied in

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