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1982

Commercial VSIS laser for CD players (Sharp Corporation)

~ Discrete Semiconductor/Others ~

Initially, structure of a GaAs/AlGaAs semiconductor laser was complicated for mode stabilization etc., so that the manufacturing yield was extremely poor, and they were expensive. They were used only in the field of expensive measurement and communication equipment, but difficult to use in the consumer field requiring large volume production. Home CD players commercialized by Sony and Philips were equipped with GaAs/AlGaAs semiconductor lasers, and many other manufacturers were developing it. Prolongation of product life was the problem for the commercialization.
Sharp developed a VSIS (V-channeled Substrate Inner Stripe) structure using its own p-type GaAs substrate, achieving an astonishing product life of about 40,000 hours at that time, and they succeeded in the mass-production of GaAs/AlGaAs semiconductor laser for CD players for the first time in the industry.

VSIS structure laser was made as shown in the Figure. V-shaped groove was formed on p-type substrate with an epitaxial n-GaAs layer, and then p-type AlGaAs cladding layer, a p-type AlGaAs active layer, an n-type AlGaAs cladding layer, and an n-type GaAs cap layer were successively grown.
It had a self-alignment structure that required neither mask alignment nor diffusion process, and it could be manufactured with relatively inexpensive liquid phase growth, resulting in low manufacturing cost.
In the peak period, the production volume reached millions per year, and they continued to be manufactured for about 20 years until around 2000.

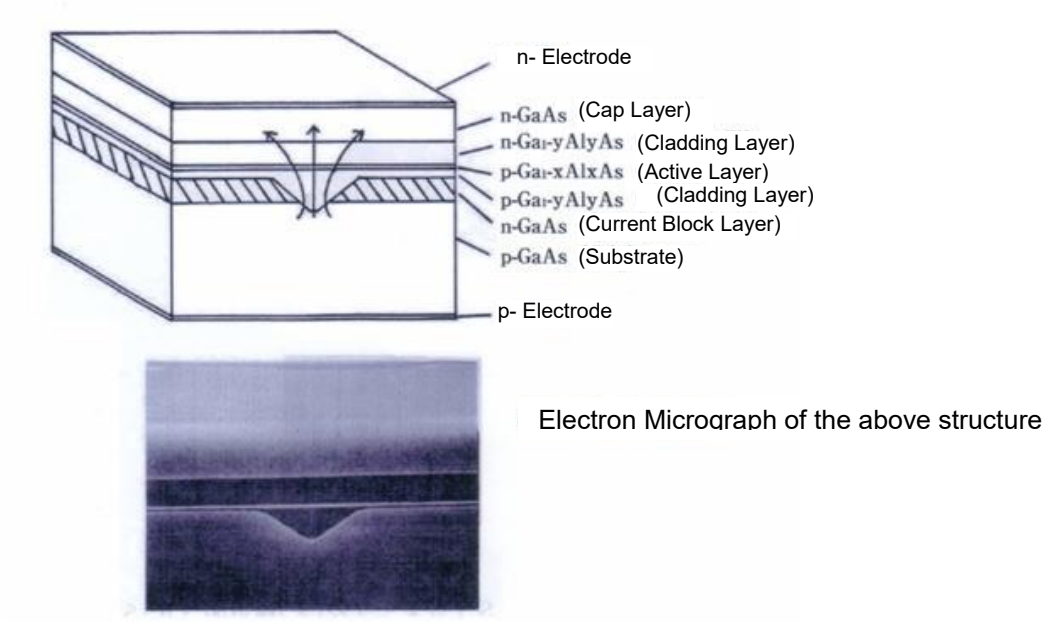

Fig.1 Structure schematic of VSIS laser and electron micrograph of cross section

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