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Jon W. I. Dudas

Director of the United States Patent and Trademark Office



(12) **United States Patent**
Häusler et al.

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(54) **METHOD AND DEVICE FOR PASSIVATION OF THE RESONATOR END FACES OF SEMICONDUCTOR LASERS BASED ON III-V SEMICONDUCTOR MATERIAL**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 17 days.

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(52) **U.S. Cl.** **438/38; 372/49**

(58) **Field of Classification Search** 372/43-50; 438/38

See application file for complete search history.

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(57) **ABSTRACT**

A method and device for passivating the resonator end faces, in particular the cleaved edges of semiconductor laser diodes, by high-temperature epitaxy of the quaternary compound semiconductor $In_xGa_{1-x}As_yP_{1-y}$, where $(0 \leq x \leq 1$ and $0 \leq y \leq 1)$. To passivate the $In_xGa_{1-x}As_yP_{1-y}$, an additional passivation layer may be applied in situ. The semiconductor crystal is brought to the temperature required for the epitaxy by being heated. To avoid thermal destruction of the contact metal during the epitaxy, the metal is only deposited after the cleaving operation and the passivation. The deposition of the metal on the passivated laser bar is carried out by means of special equipment that allows deposition of metal on the entire surface of the laser and at the same time prevents vapour deposition on the cleaved edges. The method and device can be applied to the production of high-power laser diodes.

8 Claims, 3 Drawing Sheets