

Aluminum nitride crystal

Achieve an unprecedented growth rate!

Overview

The deep ultraviolet light emitting device (DUV-LED) is fabricated from AlGaN-based nitride semiconductor. As the substrate material of the AlGaN-based DUV-LED, high lattice consistency with AlGaN, wider band gap than AlGaN, and high thermal conductivity are required, and aluminum nitride (AlN) which satisfies these conditions is noticed.

Since AlN shows high dissociation pressure at high temperature, it is difficult to grow AlN crystal by crystal growth technique from melt such as CZ method. Therefore, single crystal growth using sublimation method is mainly carried out. However, the sublimation method requires extremely high temperature to sublime AlN, which makes it difficult to increase the size of crystal, reduce impurities such as carbon, and reduce the cost.

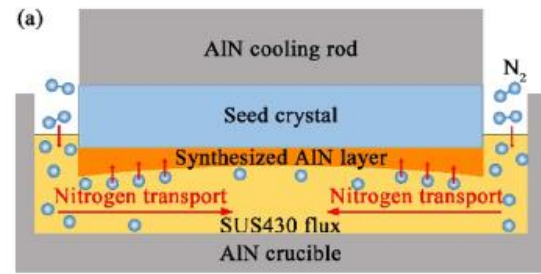
The present invention has made it possible to grow high-quality AlN single crystal at a higher growth rate than the conventional liquid phase growth technique by the liquid phase growth method using Fe-based flux.

Product Application

- AlN crystal as AlGaN-based nitride semiconductor substrate
- Deep ultraviolet element or power semiconductor

IP Data

IP No. : PCT/JP2023/30316
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 Admin No. : T22-259

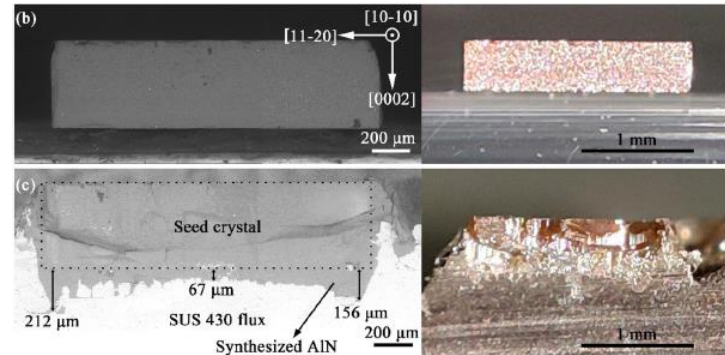


Schematic diagram of AlN crystal growth

Growth rate of AlN single crystals: 16–53 μm/h

Flux : SUS430

growth temperature : 1948-1973 K, growth time : 4 h
 AlN Crucible, N₂ gas 1 bar



**AlN single crystal film thickness formed:
 67–212 μm**

Related Works

- [1] AIP Advances 13,8, 085105, 2023.8.1 (2023)
- [2] LI Sen, , ADACHI Masayoshi, OHTSUKA, Otsuka Makoto, FUKUYAMA Hiroyuki, Japan Society of Metals, Japan Society of Metals, Spring 2023 (172) Lecture Meeting

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