

# Method for the production of aluminum nitride crystals using flux

Able to produce aluminum nitride crystals at low cost and high growth rate

## Summary

Deep Ultraviolet Light Emitting Devices (DUV-LED) are fabricated from AlGaIn-based nitride semiconductor. The AlGaIn-based DUV-LED substrate material requires high degree of lattice matching with AlGaIn, wider bandgap than AlGaIn, and higher thermal conductivity. Aluminum nitride (AlN) which meets those conditions has been attracting attention as a substrate material.

AlN shows high dissociation pressure at high temperatures, and it is difficult to grow AlN crystals from its own melt, such as the CZ method. Therefore, single-crystal growth using sublimation, HVPE, and liquid-phase growth method have been used but those methods require high temperatures and do not produce crystals that are practical in terms of size, quality, and cost.

This invention is able to provide a method for the production of AlN crystals by the liquid phase growth method, which enables to grow AlN crystals at low cost and high growth rate.

## Effect

- Ga-Al flux liquid phase growth method, higher growth rate than HVPE (tab)
- Lower temperature than sublimation and therefore low cost (tab)
- Producing aluminum nitride crystals with aligned crystal orientation (fig)

## Application

AlGaIn-based nitride semiconductor substrates

## Patent Data Sheet

Patent publication number (Serial No): JP2020-141981 (T20-429)

Inventors: ADACHI Masayoshi, FUKUYAMA Hiroyuki,  
OHTSUKA Makoto, KAMBARA Arata

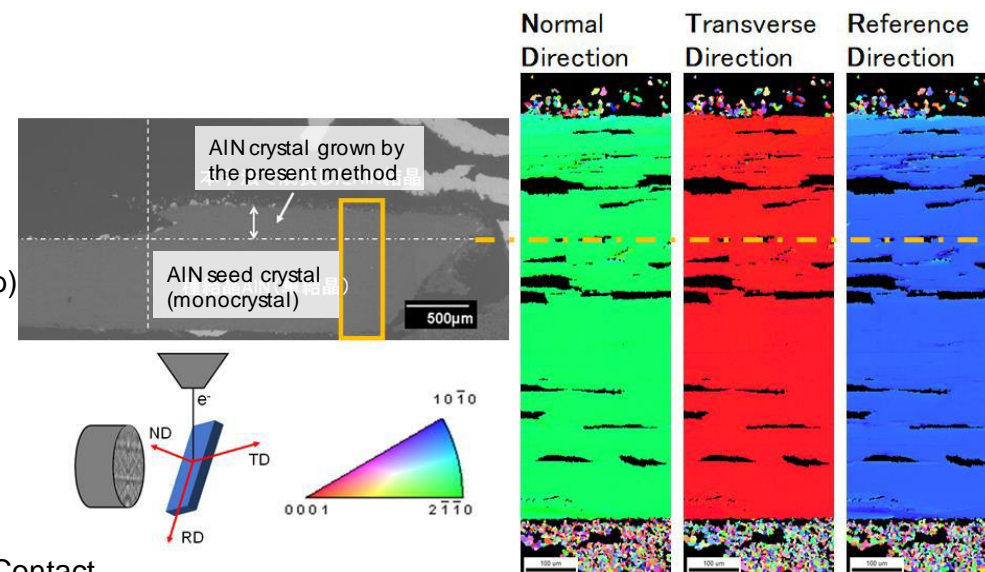
Applicant: Tohoku University

**Table: Comparison of the aluminum nitride growth method of the present invention with conventional techniques**

	This invention	Ga-Al liquid-phase growth	Sublimation	HVPE
Process temperature	2053 K	1573 K	2400 K	1773 K
Growth rate	90 $\mu\text{m/h}$	0.24 $\mu\text{m/h}$	100 $\mu\text{m/h}$	40 $\mu\text{m/h}$

**Figure: Inverse pole figure map**

Inverse pole figure map of aluminum nitride crystal produced in the present invention



Contact

Tohoku Techno Arch Co., LTD

TEL:+81-22-222-3049, FAX:+81-22-222-3419

[Click](#) to contact