# （開発品）パワーHEMT用GaN on Si基板

## GaN Epitaxial Film on Si Substrates for Power HEMT Devices

**コバレントマテリアルは、Si基板上にGaN単結晶をヘテロエピタキシャル成長させたGaN基板を開発中です。**

Covalent Materials is developing GaN substrates composed of GaN epitaxial films grown on Si substrates (GaN on Si).

## 特長 Features

- バッファ層を設けたSi基板上へのGaN単結晶ヘテロエピタキシャル成長
  The heteroepitaxial growth of monocrystalline GaN on Si substrates using buffer layers
  - 総耐圧:200V/μmを実現
    Vertical breakdown voltages over 200V/μm is possible
  - 窒化物多層バッファに加え、3C-SiCバッファが可能
    Buffer layers composed of nitride multilayers and 3C-SiC are possible
- サファイアやSiC基板と比較して、大口径および経済的なGaN基板を提供可能
  Large diameters and inexpensive than the other GaN on SiC or sapphire substrates

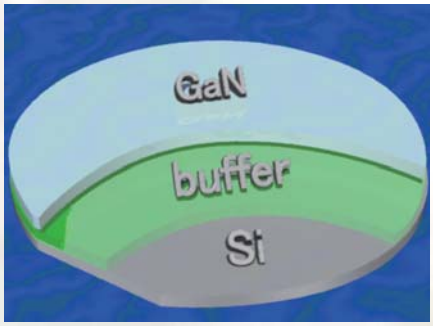
## 用途 Applications

数百V級の中耐圧パワーデバイス作製用基板

GaN on Si substrates for fabrication of power devices with breakdown voltages over hundreds of volts

- パワーデバイス作製用GaN HEMT基板
  GaN HEMT substrates for power device fabrications
- 高周波･高出力デバイス作製用GaN HEMT基板
  GaN HEMT substrates for high radio frequency and high power device fabrications

## コンセプト Concept



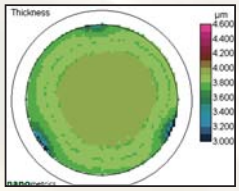

Heteroepitaxial growth using buffer layers

## データ Typical data

### 特性 Characteristics

| | |
|---|---|
| Crystal structure | GaN |
| Area size | φ3~4inch |
| Breakdown voltage | ≧600V |
| Warpage | ≦40μm |
| Frontsurface | as grown |
| Backsurface | Si etched |
| AlGaN-HEMT structure | possible |


Surface morphology of the GaN



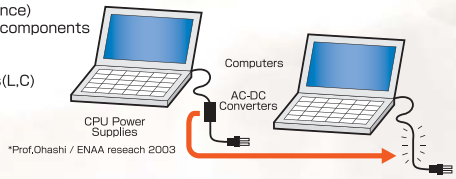

Thickness mapping(φ3inch)

※Standard deviation:2.0% 6mm edge exclusion

## 未来予想図 Impact of GaN on Si for our life in the future

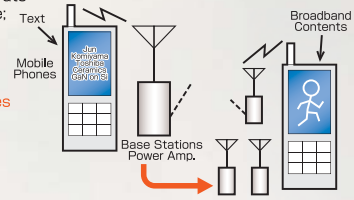
■ Output Power Density Increasing Trend

Output power density will increase 10 times every 15 years ; Current 1 W/cc(Y2000)
→10W/cc(Y2015)*Key for further comply the trend(volume reduction);
●Low Power Loss(=Low resistance)
→Compact heat sinks / cooling components (power loss→heat)
●High frequency
→Compact passive components(L,C)
●Reasonable price
→GaN on Si based devices




■ Higher Efficiency Amplifiers forWireless Communication

Increase in data transfer rate
→Key device performance;
●Higher frequency
●Higher output power
●Higher efficiency
●Reasonable price
→GaN on Si based devices

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