

Standard specifications of 4 inch Sn-doped β -Ga₂O₃ substrates

4 inch substrates		
Orientation		(001)
Dopant		Sn
Conductivity		n-type
N_d-N_a (cm ⁻³)		$1 \times 10^{18} \sim 2 \times 10^{19}$
Dimensions	Diameter (mm)	100 ±0.5
	Orientation flat width (mm)	32.5 ±2.5
	Index flat width (mm)	18.0 ±2.5
	Thickness (mm)	0.65 ±0.02
	Reference	Fig. 1
Offset angle (degree)	[010]:	0 ±1
	[100]:	0 ±1
FWHM (arcsec)	[010]:	350 or less
	[100]:	350 or less
Surface	Front	CMP
	Back	CMP

Remarks

- 1 These products must be used for research and development purposes only.
- 2 The substrates must not be used as a seed crystal.
- 3 The specifications are subject to change without notice.

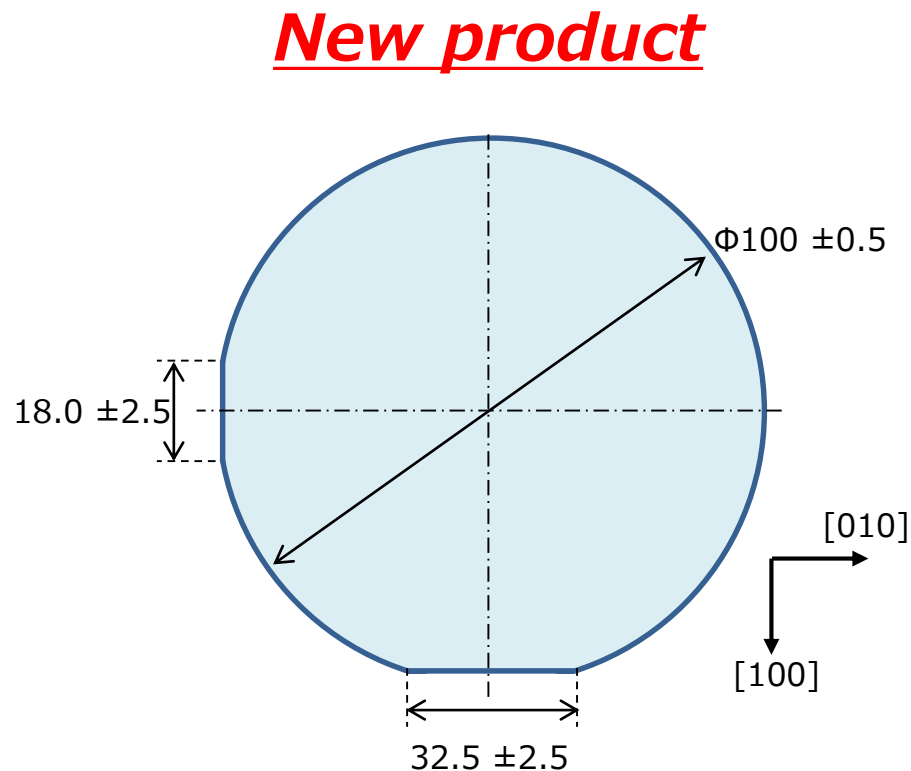


Fig. 1



Standard specifications of 2 inch (001) Sn-doped β -Ga₂O₃ substrates

2 inch substrates		
Orientation		(001)
Dopant		Sn
Conductivity		n-type
Nd-Na (cm ⁻³)		$1 \times 10^{18} \sim 2 \times 10^{19}$
Dimensions	Diameter (mm)	50.8 ± 0.3
	Orientation flat width (mm)	15.9 ± 2.5
	Index flat width (mm)	8.0 ± 2.5
	Thickness (mm)	0.65 ± 0.02
	Reference	Fig. 2
Offset angle (degree)	[010]:	0 ± 1
	[100]:	0 ± 1
FWHM (arcsec)	[010]:	350 or less
	[100]:	350 or less
Surface	Front	CMP
	Back	CMP

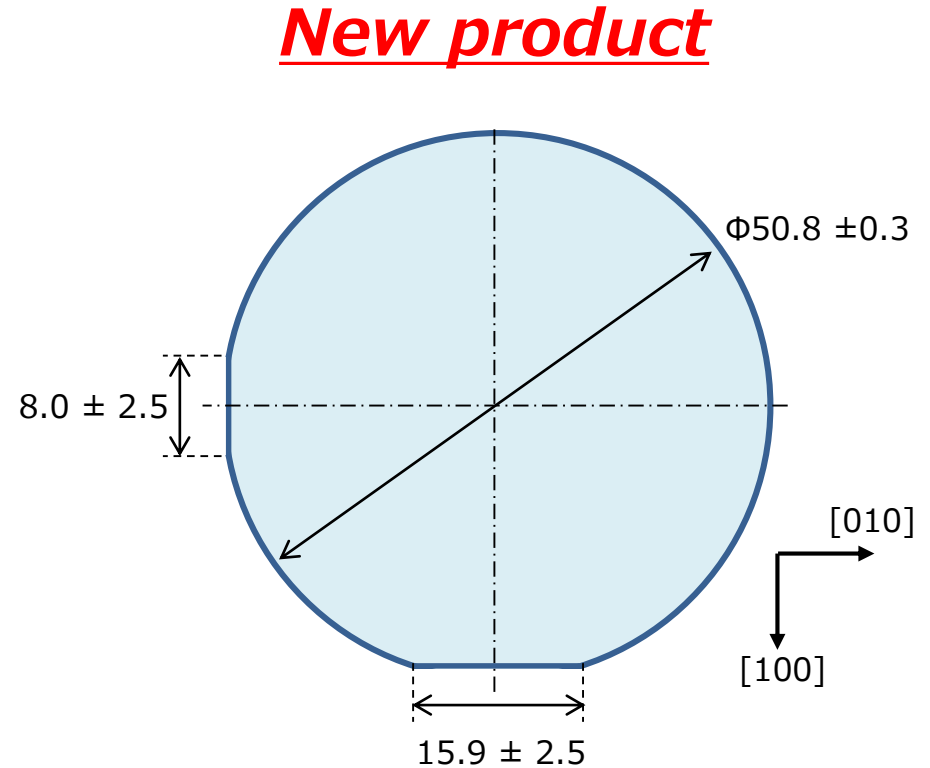


Fig.2

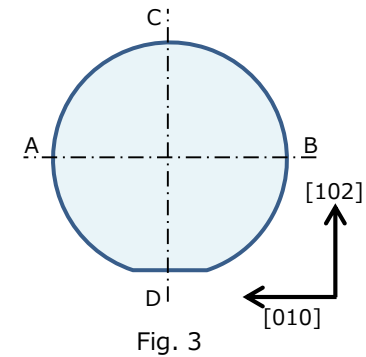


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Standard specifications of 2 inch ($\bar{2}01$) β -Ga₂O₃ substrates

		2 inch substrates		
Orientation		$\bar{2}01$		
Dopant		Sn	Unintentionally-doped	Fe
Conductivity		n-type	n-type	Insulating ($> 10^{10}\Omega \cdot \text{cm}$)
N_d-N_a (cm ⁻³)		$1 \times 10^{18} \sim 9 \times 10^{18}$	$\leq 9 \times 10^{17}$	-
Dimensions	A-B (mm)	50.8 ± 0.3	50.8 ± 0.3	50.8 ± 0.3
	C-D (mm)	49.5 ± 0.3	49.5 ± 0.3	49.5 ± 0.3
	Thickness (mm)	0.68 ± 0.02	0.68 ± 0.02	0.68 ± 0.02
	Reference	Fig. 3	Fig. 3	Fig. 3
Offset angle (degree)		[010]: 0 ± 0.4	[010]: 0 ± 0.4	[010]: 0 ± 1
		[102]: -0.7 ± 0.4	[102]: -0.7 ± 0.4	[102]: -0.7 ± 1
FWHM (arcsec)		[010]: 150 or less	[010]: 150 or less	[010]: 150 or less
		[102]: 150 or less	[102]: 150 or less	[102]: 150 or less
Surface	Front	CMP	CMP	CMP
	Back	Grinding	Grinding	Grinding



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Standard specifications of 25x25 mm² β -Ga₂O₃ substrates

		25x25 mm ² substrates
Orientation		(010)
Dopant		Fe
Conductivity		Insulating ($> 10^{10}\Omega \cdot \text{cm}$)
N_d-N_a (cm ⁻³)		-
Dimensions	A-B (mm)	25 +0.3, -1
	C-D (mm)	25 +0.3, -1
	Thickness (mm)	0.5 ±0.02
	Reference	Fig. 3
Offset angle (degree)		[001]:0 ±1
		⊥[001]:0 ±1
FWHM (arcsec)		[001]:350 or less
		⊥[001]:350 or less
Surface	Front	CMP
	Back	Grinding

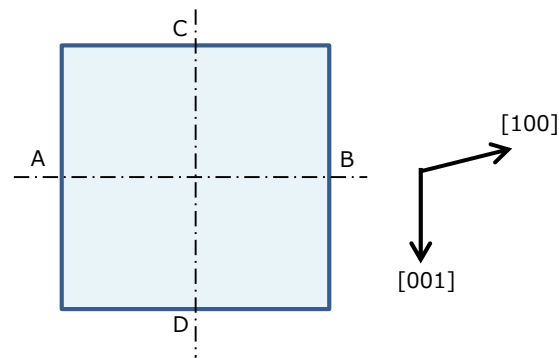


Fig. 3

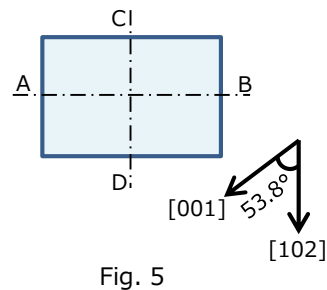
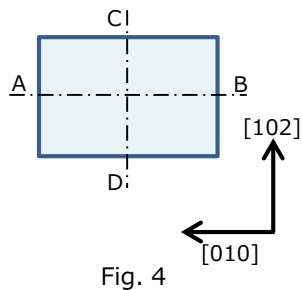
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Standard specifications of 10x15 mm² β -Ga₂O₃ substrates

		10x15 mm ² substrates					
Orientation		$(\bar{2}01)$			(010)		
Dopant		Sn	Unintentionally-doped	Fe	Sn	Unintentionally-doped	Fe
Conductivity		n-type	n-type	Insulating ($> 10^{10}\Omega \cdot \text{cm}$)	n-type	n-type	Insulating ($> 10^{10}\Omega \cdot \text{cm}$)
N_d-N_a (cm ⁻³)		$1 \times 10^{18} \sim 9 \times 10^{18}$	$\leq 9 \times 10^{17}$	-	$1 \times 10^{18} \sim 9 \times 10^{18}$	$\leq 9 \times 10^{17}$	-
Dimensions	A-B (mm)	15 ±0.3	15 ±0.3	15 ±0.3	15 ±0.3	15 ±0.3	15 ±0.3
	C-D (mm)	10 ±0.3	10 ±0.3	10 ±0.3	10 ±0.3	10 ±0.3	10 ±0.3
	Thickness (mm)	0.68 ±0.02	0.68 ±0.02	0.68 ±0.02	0.5 ±0.02	0.5 ±0.02	0.5 ±0.02
	Reference	Fig. 4	Fig. 4	Fig. 4	Fig. 5	Fig. 5	Fig. 5
Offset angle (degree)	[010]: 0 ±0.4	[010]: 0 ±0.4	[010]: 0 ±1	\perp [102]: 0 ±1	\perp [102]: 0 ±1	\perp [102]: 0 ±1	\perp [102]: 0 ±1
	[102]: -0.7 ±0.4	[102]: -0.7 ±0.4	[102]: -0.7 ±1	[102]: 0 ±1	[102]: 0 ±1	[102]: 0 ±1	[102]: 0 ±1
FWHM (arcsec)	[010]: 150 or less	[010]: 150 or less	[010]: 150 or less	\perp [102]: 150 or less	\perp [102]: 150 or less	\perp [102]: 150 or less	\perp [102]: 150 or less
	[102]: 150 or less	[102]: 150 or less	[102]: 150 or less	[102]: 150 or less	[102]: 150 or less	[102]: 150 or less	[102]: 150 or less
Surface	Front	CMP	CMP	CMP	CMP	CMP	CMP
	Back	Grinding	Grinding	Grinding	Grinding	Grinding	Grinding



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Standard specifications of 10x15 mm² β -Ga₂O₃ substrates

		10x15mm ² substrates		
Orientation		(001)		
Dopant		Sn	Unintentionally-doped	Fe
Conductivity		n-type	n-type	Insulating (> 10 ¹⁰ Ω · cm)
Nd-Na (cm ⁻³)		1×10 ¹⁸ ~2×10 ¹⁹	≤9×10 ¹⁷	-
Dimensions	A-B (mm)	15 ±0.3	15 ±0.3	15 ±0.3
	C-D (mm)	10 ±0.3	10 ±0.3	10 ±0.3
	Thickness (mm)	0.65 ±0.02	0.65 ±0.02	0.65 ±0.02
	Reference	Fig. 5	Fig. 5	Fig. 5
Offset angle (degree)		[010]:0 ±1	[010]:0 ±1	[010]:0 ±1
		[100]:0 ±1	[100]:0 ±1	[100]:0 ±1
FWHM (arcsec)		[010]:150 or less	[010]:150 or less	[010]:150 or less
		[100]:150 or less	[100]:150 or less	[100]:150 or less
Surface	Front	CMP	CMP	CMP
	Back	Grinding	Grinding	Grinding

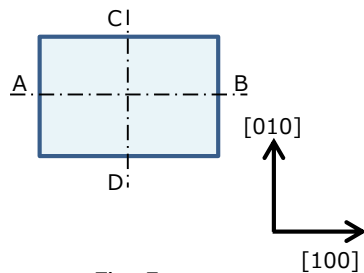


Fig. 5

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Novel Crystal Technology, Inc.

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