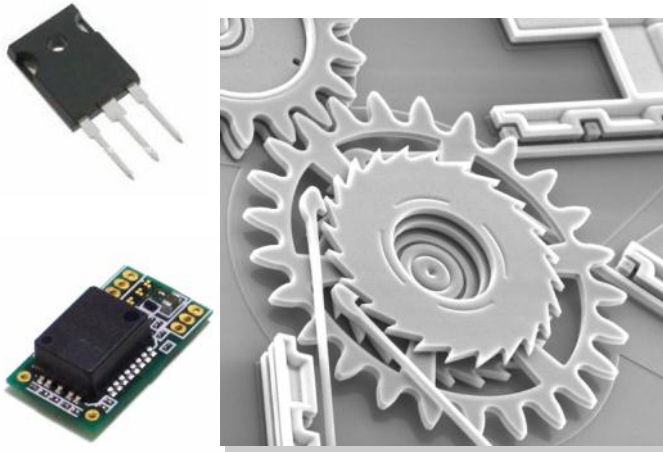


Product data sheet: **Silicon on Insulator (SOI)**



IQE's new fully customisable ultrasmooth Silicon on Insulator (SOI) is now available in wafer sizes up to 8" (200mm).

- The key features are:
- Thickness up to 50µm
- Thickness uniformity better than 3%
- Full range of doping and resistivities
- 4", 6" and 8" wafer sizes
- Multilayers
- Available in production runs from 50 wafers
- COP free

For MEMS, sensors and high voltage applications.

For further information contact Rob Harper or Moz Fisher at:

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Parameter	
Wafer size	100mm, 150mm and 200mm wafers
Material structure	Silicon device layer on oxidised silicon substrate
Device layer thickness	0.15µm to 50µm
Device layer thickness uniformity	±3%
Device layer dopants	Arsenic / Phosphorous / Boron
Device layer resistivity	0.001 to 100Ω.cm
Device layer resistivity uniformity	±2% up to 6Ω.cm, ±6% up to 30Ω.cm, ±15% up to 100Ω.cm
Device layer orientation	<100>, <111>
Box layer thickness	0.1µm to 1µm
Box layer uniformity	±3%
Substrate resistivity	0.001 to 22Ω.cm
Substrate orientation	<100>, <111>
Substrate dopants	Arsenic / Phosphorous / Boron
LPD	<20 at 0.2µm
Metals	< 2e ¹⁰ as measured by VPD

SOI production wafers are available now in 4" (100mm), 6" (150mm) and 8" (200mm) diameter wafer sizes.

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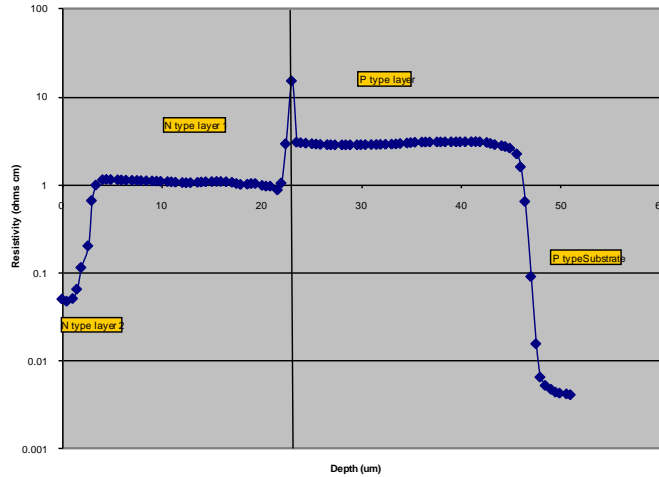
Product data sheet: **High Quality Silicon Epitaxy**

For further information contact Rob Harper or Moz Fisher at:

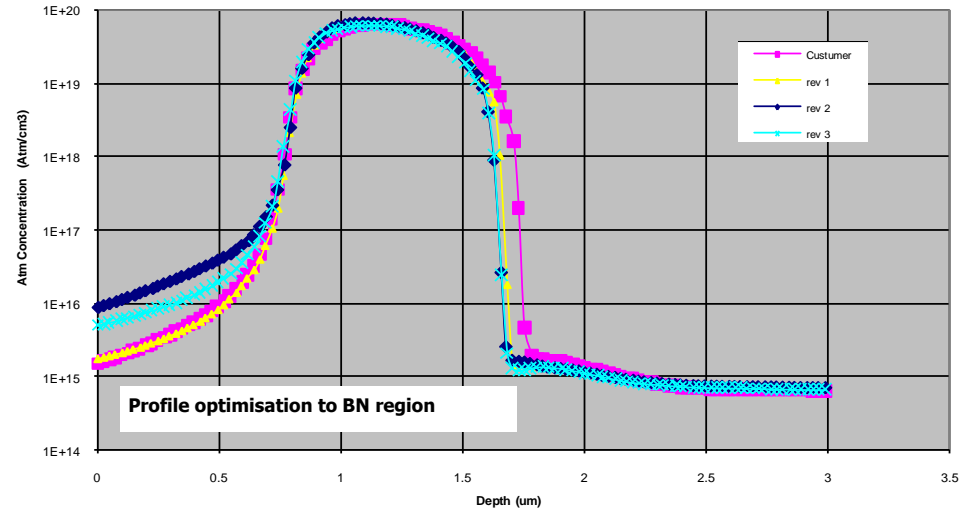
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SRP profile showing process optimisation to match customer sample



Example of multi-layer epitaxial structure



Parameter	
Wafer size	4", 6" and 8" wafers
Thickness	Up to 50µm
Thickness uniformity	<2% across wafer, typical <1.5%
Resistivity	0.001Ω.cm to >400Ω.cm
LPD	Less than 20 at 0.2µm for set-up wafer, typical less than 10
Dopant	As, Ph and B
Si sources available	DCS, TCS and SiH4
Process type	RP and ATM process available
Buried epitaxy	In-house electrical profile matching capability
Layers	Any combination of Si layers (multi-layers with sharp transition zones, buried layers, buffer layers)
Metals	<5e10cm ⁻² as measured by VPD

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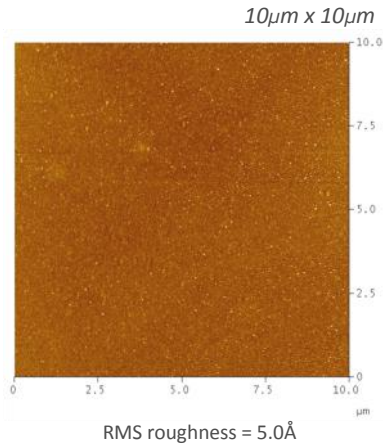
Product data sheet: Germanium on Insulator (GeOI)

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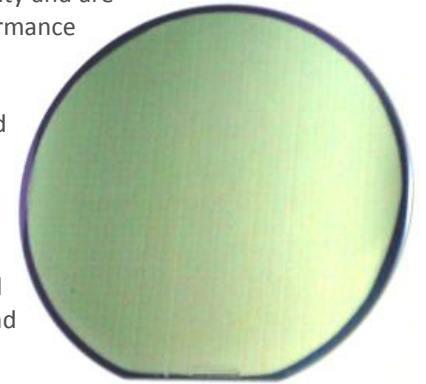
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Atomic Force Microscopy (AFM)



IQE's new engineered GeOI substrates offer extremely high crystal quality and are available now, allowing device designers to look beyond the performance constraints imposed by existing silicon technologies.

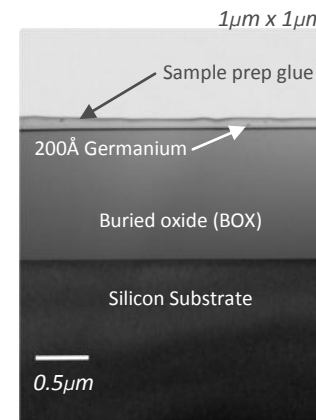
IQE offers its new germanium on insulator (GeOI) substrates, produced using a unique patented process to manufacture in high volume Ge on Si/SiO₂ substrates with extremely low threading dislocation defect density. Other technologies typically produce threading dislocation densities orders of magnitude higher than IQE's proprietary technology, which also has the advantages of producing GeOI material with exceptionally smooth surfaces and very uniform film thickness and electrical properties.



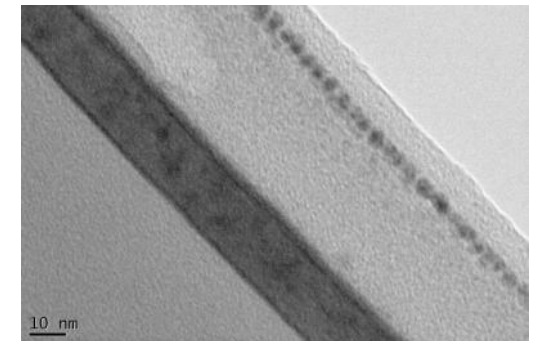
Parameter	Method/tool	Target spec	Best achieved
Wafer size		6 inch	6 inch
Required thickness	SE and TEM	To customer specification	
Ge Thickness uniformity	SE	<3%	4% across 6"
Surface roughness	AFM (10 μm x 10 μm)	<10 Å	5 Å
Threading dislocation density	TEM	<1e5 cm ⁻²	<1e5 cm ⁻² *
Buried oxide thickness	200 Å - 10,000 Å	As required	As required
Thermal stability	Max temp	850°C	TBD
Metals	VPD	<5e10 cm ⁻²	TBD
Dopant	SIMs	N-type	N-type
Coverage		100% (5mm edge)	~95%
Bow	Verified as per supplied wafer		
Warp	Verified as per supplied wafer		

* below detection limits

Cross Sectional Electron Microscopy (XTEM)



GeOI development kits are available now in 6" (150mm) diameter wafer sizes. 8" (200mm) wafers will be available later this year.



Product data sheet: Germanium on Silicon (GeOSi)

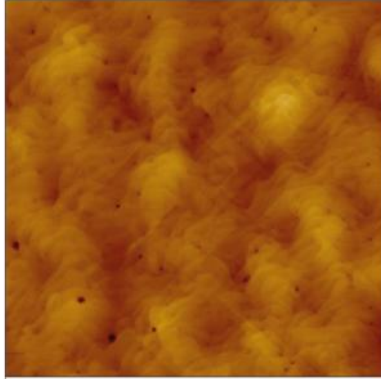
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Atomic Force Microscopy (AFM)

20µm x 20µm



0 20.0 µm

RMS roughness = 0.530nm

IQE's new engineered GeOSi substrates offer extremely high crystal quality and are available now, allowing device designers to look beyond the performance constraints imposed by existing silicon technologies.

IQE offers two types of Germanium on Silicon:

- a layer of germanium deposited straight onto a silicon substrate.
- a more advanced offering whereby we deposit a buffer SiGe layer between a layer of silicon and a layer of germanium, thus reducing the number of defects we introduce in the layers. [see *Strained Silicon, SiGe on Silicon and Ge on Silicon + SiGe buffer data sheet*]

Both of these materials have applications in the solar industry.

Parameter	
Wafer size	4", 6" and 8" wafers
Material structure	Ge layer epitaxially deposited directly onto silicon substrate
Ge Thickness	Typically 1µm or less
Ge layer surface roughness	Less than 1.5nm as measured on a 20µm x 20µm AFM *
Thickness uniformity	±3%
Dopant	Both N and P type available up to 5e19 concentration as measured by SIMs in pure Ge
LPDs	<20 at 0.2µm for set-up wafer
Defectivity	Approx 2e ⁷ dependent on material thickness and dopant: IQE utilises proprietary techniques to optimise
Metals	<5e10cm ⁻² as measured by VPD
Substrate	IQE supplied <100> material

* substrate dependent

GeOSi production wafers are available now in 4" (100mm), 6" (150mm) and 8" (200mm) diameter wafer sizes.

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Product data sheet: **Silicon on Sapphire (SoS)**

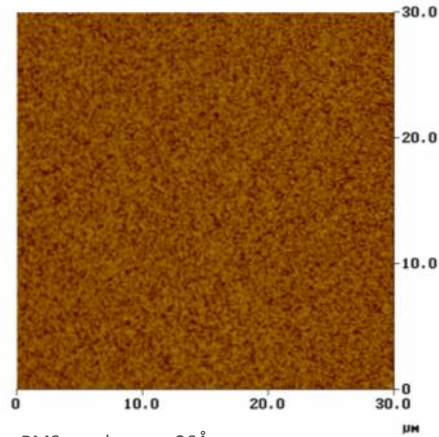
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Atomic Force Microscopy (AFM)

30µm x 30µm



Silicon on Insulator (SOI) is an established material for silicon device manufacture offering advantages in speed and power performance as well as radiation hard semiconductors for aerospace applications.

IQE's new Silicon on Sapphire (SOS) is becoming widely established in sensor design that utilise its excellent hysteresis properties.

The manufacturing techniques employed at IQE minimise defects and control surface roughness to produce an optimal material for all applications.

Parameter	
Wafer size	4" and 6" wafers
Material structure	Si layer epitaxially deposited directly onto sapphire substrate
Si Thickness	0.2µm to 2.0µm
Si layer surface roughness	Less than 50Å for 2µm layers *
Thickness uniformity	±2%
Dopant	0.1Ω.cm to 100Ω.cm
LPDs	<20 at 0.2µm for set-up wafer
Defectivity	Dependent on material thickness and dopant: IQE utilises proprietary techniques to optimise
Metals	<5e10cm ⁻² as measured by VPD
Substrate	IQE supplied r-plane material

* lower surface roughness can be achieved for thinner layers

SOS production wafers are available now in 4" (100mm) and 6" (150mm) diameter wafer sizes.

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