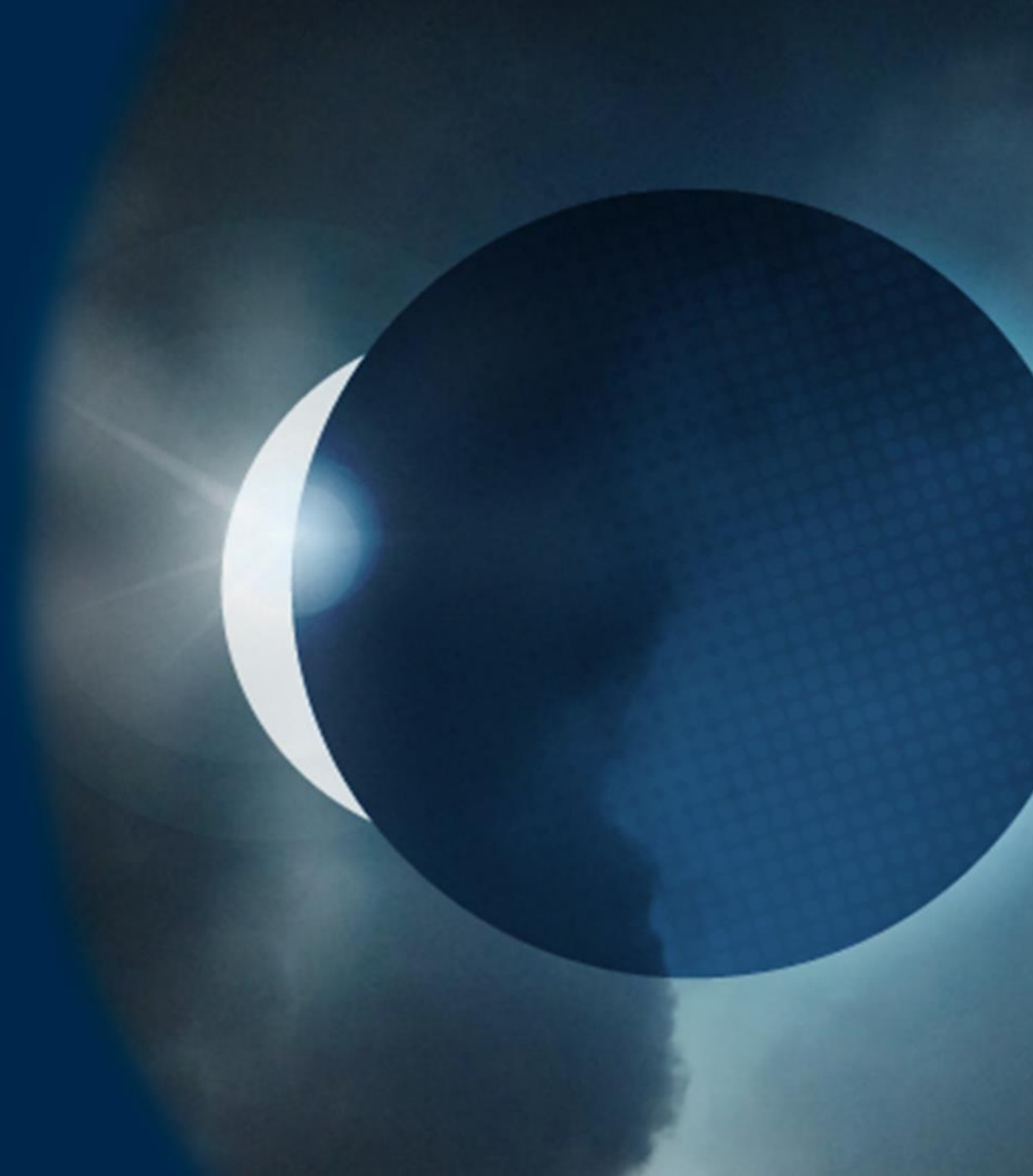
BLUGLASS (ASX:BLG)

ANNUAL GENERAL MEETING

20 NOVEMBER 2019
SYDNEY



CHAIRMAN'S REPORT

Dr William Johnson

FORWARD LOOKING STATEMENT

This document has been prepared by BluGlass Limited to provide readers with an update of the Company and the Company's technology.

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Information on Service Addressable Markets (SAM) is based on internal BluGlass modelling and assumptions, both of which depend on successful R&D outcomes and results achieved within estimated timetables. BluGlass recommends a cautious interpretation be taken by investors.

AGENDA

- Chairman's Report
- Managing Director's Report
- Chief Technology and Operations Officer's Report
- Q&A
- Formal Business

STRATEGIC REVIEW OF FY2019

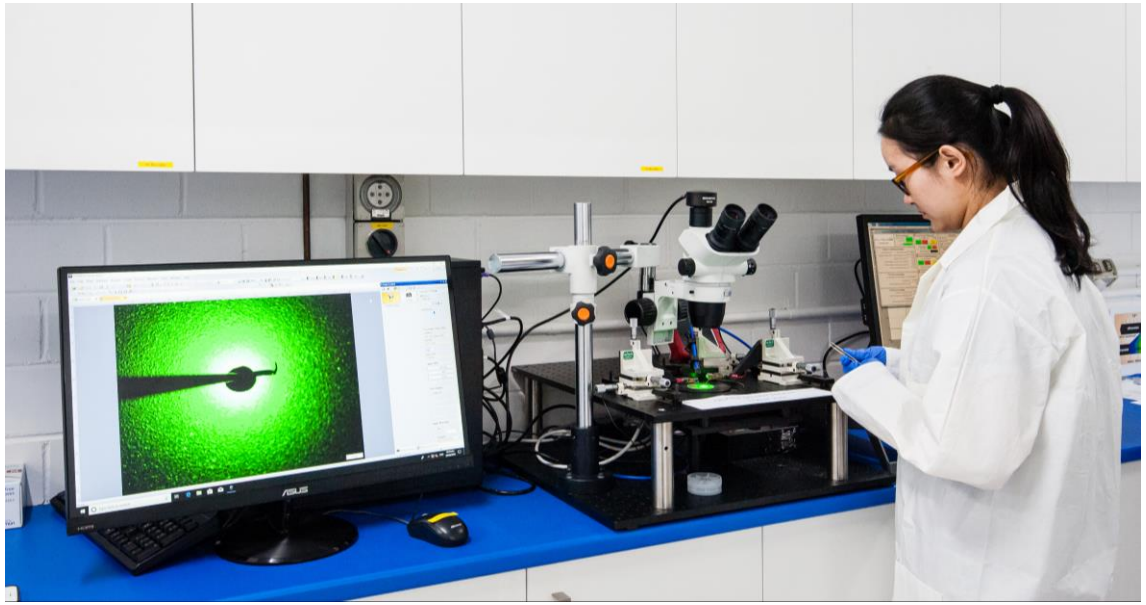
- Commercialisation of tunnel junction technology using RPCVD
- Application in cascade LEDs, laser diodes, GaN-based products
- Upgrade to Silverwater facility
- Strategic commercial developments, partnerships revenue-generating engagements
- New laser diode business with revenues expected from 2020 onwards
- Continued expansion of IP portfolio

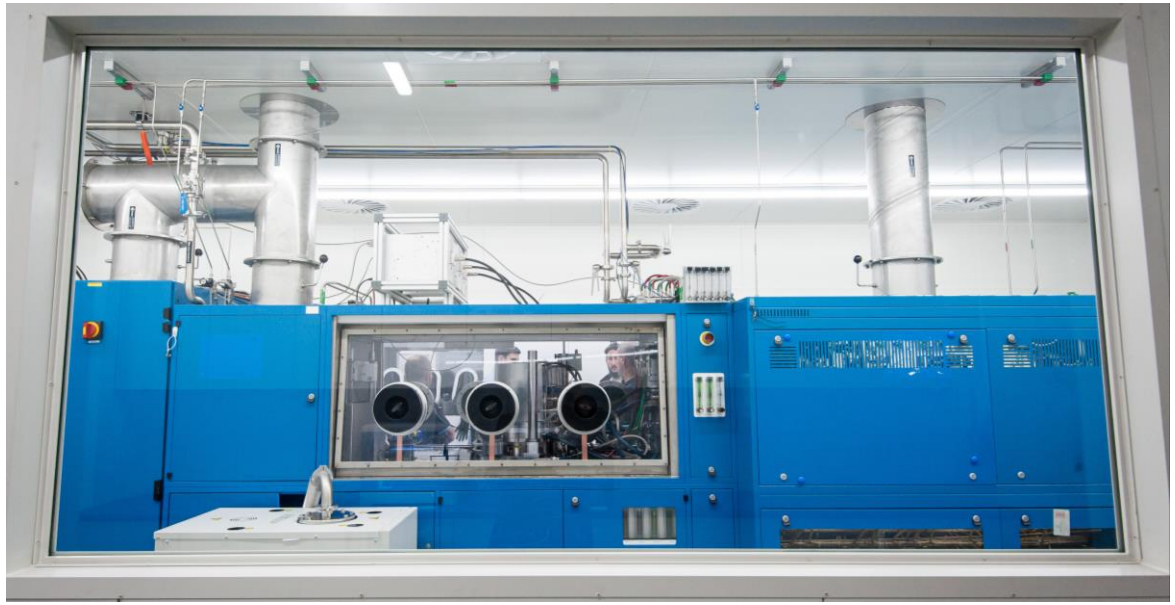
FINANCIAL SUMMARY

	FY2019	FY2018
Total Revenue	$660,195	$870,967
EpiBlu foundry Revenue	$424,555	$713,826
Interest	$235,640	$157,141
Net Assets	$11,643,573	$25,388,999
Impairment Expense	($8,695,000)	-
Monthly Burn Rate	$632,000	$534,000
R&D Tax Rebate	$2,365,688	$1,987,040
Cash Position (as at end of FY)	$6,116,427	$5,353,777

CY2020: INCREASED LEVERAGE OF NEW CAPACITY & CAPABILITY

- Continuing cascade LED development with Bridgelux and other LED companies
- Launch first laser diode products to market
- Increase foundry revenue
- Continue to explore novel applications for RPCVD
- Further strengthen IP, patent portfolio





MANAGING DIRECTOR'S REPORT

Giles Bourne

KEY HIGHLIGHTS FY2019/CY2019

	Research Phase	Industry Collaboration and Development	Commercialisation Phase
DEC	Tunnel junction patent granted		
JAN	Collaboration with AIXTRON on scaling RPCVD to commercial sizes		
FEB	RPCVD tunnel junction data presented to market		
MAR		Target announced of 10% performance improvement, 10% cost improvement using RPCVD tunnel junctions for cascade LEDs	
MAY		X-Celeprint uses BluGlass' RPCVD in high-performance microLED prototypes	
JUL		BLG-300II online. BluGlass awarded cornerstone US patent for RPCVD tunnel junctions	
AUG		Paul Dunnigan Labs opened: tripling of development and manufacturing capacity to accelerate delivery of commercial output	
SEP		BluGlass collaborates with Bridgelux on RPCVD tunnel junctions for general lighting applications	
OCT			BluGlass launches new GaN laser diode business unit
JAN			Retrofit of AIX-2800 G4 expected early CY2020

COMMERCIAL & PARTNER ENGAGEMENTS

bridgelux

- International leader in the development of performance, energy-efficient, cost-effective LED solutions for the general lighting market
- JDA covers foundry revenues to BluGlass while both partners jointly investigate new applications for RPCVD

$6.8B general lighting market (packaged LEDs) (2018)

XCeleprint

- World leader in micro-transfer printing (µTP) technology
- Using RPCVD to deliver active matrix microLED display prototypes.

$20B microLED market (2024)

AIXTRON

- AIXTRON collaborating on scaling RPCVD technology with collaborative retrofit of the AIX 2800 G4 at BluGlass' facility
- AIXTRON evaluating equipment partnership for the delivery of RPCVD to market at scale

$1.4B global MOCVD equipment market (2025)

Sources: Strategies Unlimited, Yole Développement & Markets and Markets, Market Study Report LLC

NEW MANUFACTURING LABORATORIES

SIGNIFICANT INCREASE IN RPCVD MANUFACTURING CAPACITY AND CAPABILITY

- $6 million in additional equipment and associated infrastructure
- Semiconductor wafer growth under way in the first of two additional semiconductor deposition systems, the BLG-300II
- Second deposition system, the commercial scale AIX-2800 G4, due online early CY2020
- Wafer fabrication output capability increased three-fold

GO-TO-MARKET SUMMARY

Development Program	End Market	Evaluation	Joint Dev/ Foundry	Commercialisation & Manufacturing
RPCVD TUNNEL JUNCTION TECHNOLOGY				
Bridgelux JDA	US$6.1B in 2018[1]		✓	
Continuing HB-LED collaboration discussions	Multiple high-growth market segments	✓		
Laser diode applications	US$14B in 2019[1]	✓		✓
LED APPLICATIONS				
Continuing HB-LED collaboration discussions in the industry	Multiple high-growth market segments	✓		
RPCVD EQUIPMENT				
AIXTRON collaboration & scaling program	MOCVD market to US$1.4B by 2025[1]		✓	
Other capital equipment manufacturers		✓		
microLEDs				
X-Celeprint	MicroLED market to US$20B by 2024[2]		✓	
EU LED display manufacturer	Packaged LED market US$16.7B in		✓	
OTHER APPLICATIONS				
IQE foundry			✓	
Leading integrated device manufacturer (IDM)		✓		

Sources: 1: Market Study Report, LLC 2019. 2: Yole Développement, and Market and Markets. 3: Strategies in Light.

LASER DIODE DEVELOPMENT PROGRESS & PATH TO COMMERCIALISATION

CY2019

- Tunnel junction breakthrough: significant LD market interest for RPCVD TJ LDs
- Paul Dunnigan Laboratory opening: facilities and equipment now in place to address the commercial high-margin LD market
- US Patent and Trademark Office issues US Patent 10,355,165, buried activated p-(Al,In)GaN layers
- Joint technology development with US university
- BluGlass launches laser diode business with focus on end-end supply chain for RPCVD LD tunnel junctions

CY2020

- Demonstration of laser diode products expected in 1H CY2020
- Laser diode product launch at key industry conference with initial revenues from 2H CY2020

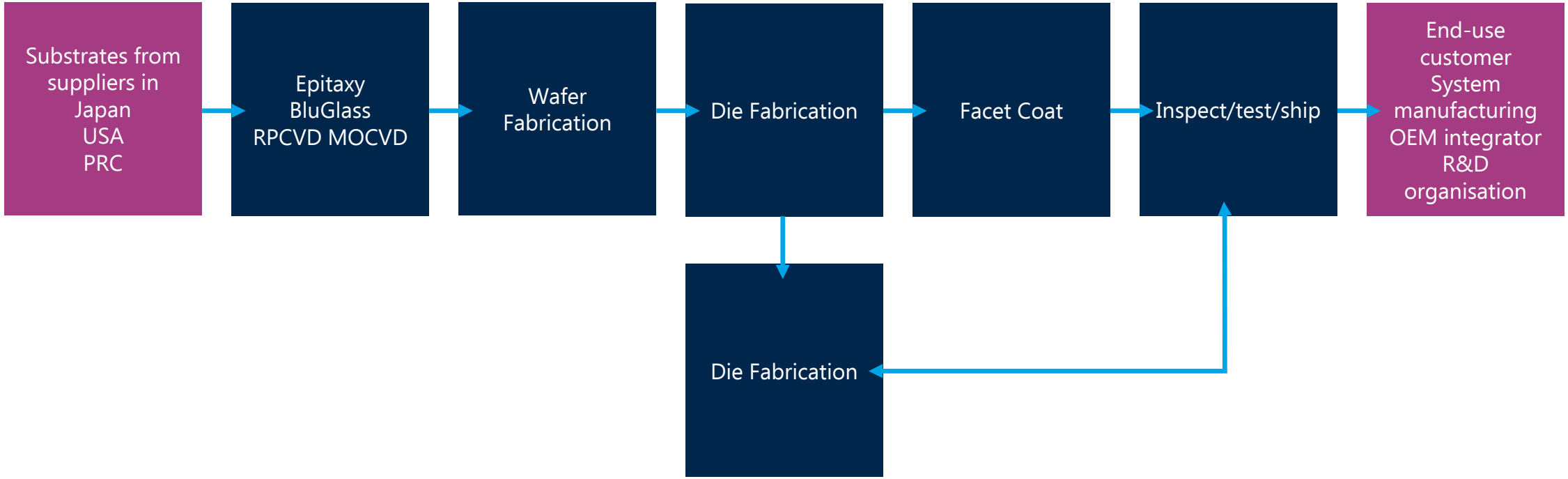
CY2021-25

- Move to profitability on commercial laser diodes (high-margin, defined-volume business)

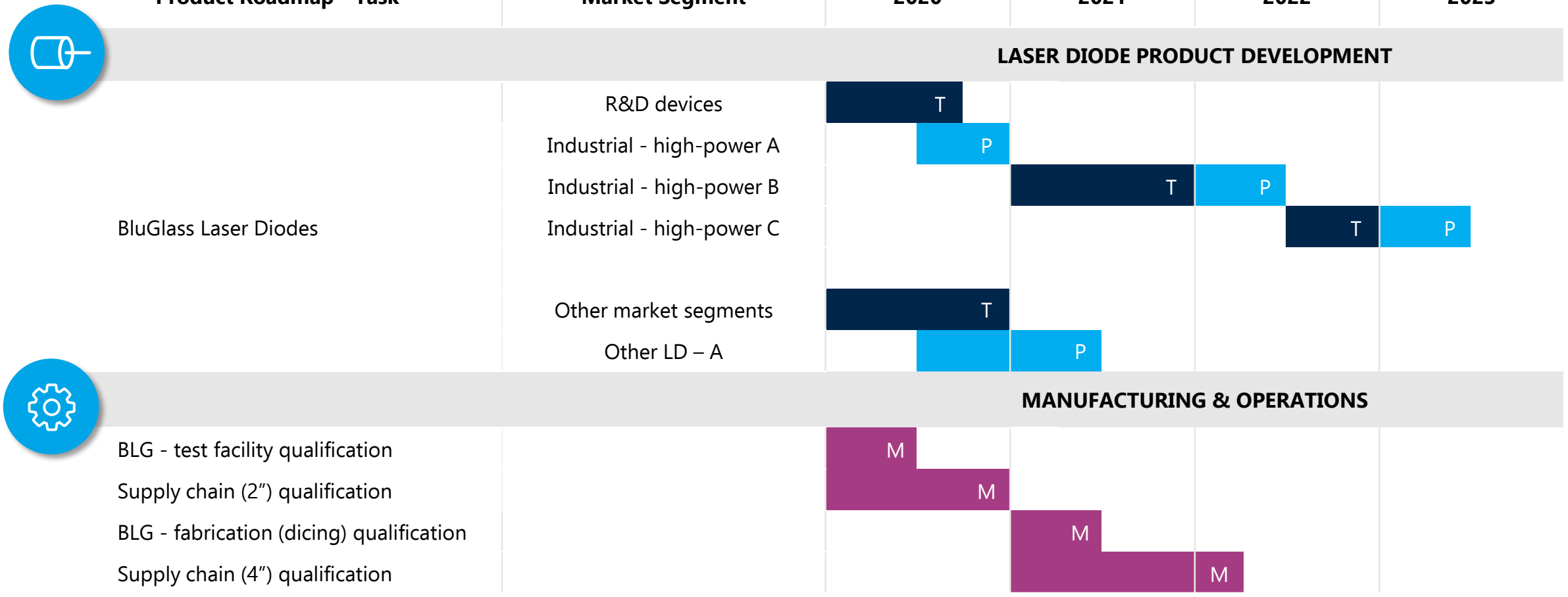
High-margin GaN laser diode end-to-end manufacture complements existing business streams and activity in high brightness LEDs, microLEDs & power electronics

BLUGLASS LASER DIODE SUPPLY CHAIN PROPOSITION: DIRECT-TO-MARKET

BLUGLASS TARGET OWNERSHIP OF SUPPLY CHAIN IN 2020



BLUGLASS LASER DIODE PRODUCT: SUPPLY ROADMAP & TIMETABLE



P: Product Launch | *T: Technology Demonstration Milestone* | *M: Manufacturing Milestone*

BRINGING PRODUCT & TECHNOLOGY DIFFERENTIATION TO MARKET

Leveraged to large and growing markets

RPCVD delivers **quantifiable performance advantages** in multiple high growth photonics markets

New **laser diode business** addresses complementary high-margin market

Strong patent portfolio

68 International Patents granted in key semi-conductor markets (USA, Europe & Asia)

15 applications under way

Across **9** Patent Families

Breakthrough Australian technology poised for global impact

Demonstrated competitive advantages with applications in multiple markets

Commercialisation partnerships & programs under way

Multiple commercialsation paths

Licensing fees / royalties

Equipment sales with equipment partner

Equipment retrofit of installed base

EpiBlu foundry business

Experienced Board and management team

Global expertise in research & commercialization

Global leadership in industry-university collaboration

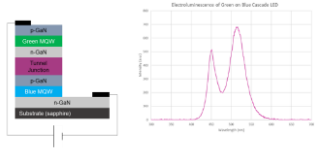
Deep specialist industry expertise

CHIEF OPERATIONS & TECHNOLOGY OFFICER'S REPORT

Dr Ian Mann

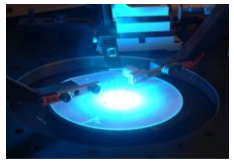
KEY APPLICATIONS OF RPCVD: BLUGLASS TECHNOLOGY FOCUS

RPCVD tunnel junction (TJ) for Cascade LED

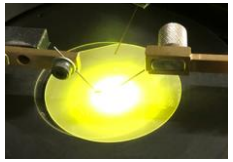


TJ for ITO replacement

RPCVD AlN for LED Applications

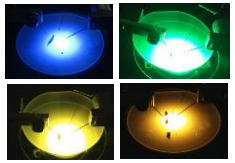


Low temperature p-GaN for long wavelength LED

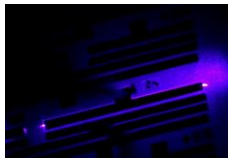


RPCVD for microLEDs

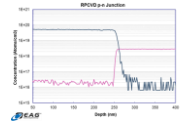
RPCVD In-rich InGaN



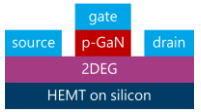
GaN Laser Diode



Low temperature p-GaN for sharp Mg diffusion

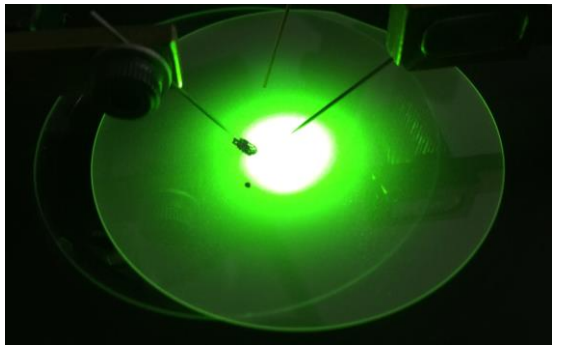


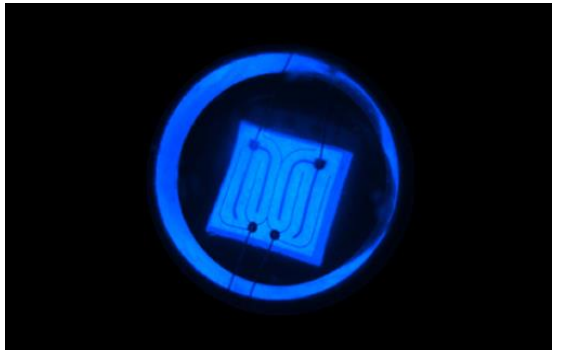
p-GaN for HEMT



KEY RPCVD TECHNICAL HIGHLIGHTS

- RPCVD tunnel junction trials with LED manufacturer Bridgelux for general lighting applications
- First demonstration of measurable cascade LED processed device with an RPCVD tunnel junction
- Progress in development of RPCVD tunnel junction-based LEDs:
    - improved LED light output, TJ uniformity, device voltage
    - further development under way to achieve commercial specifications
- Preliminary experiments showing working laser diode processed devices with RPCVD tunnel junctions
- MicroLED demonstration of RPCVD p-GaN in customer prototypes (X-Celeprint)
    - continuing work with other microLED customers on RPCVD p-GaN and longer-wavelength multi quantum well (MQW) microLEDs such as green and red
- Continued industry interest in low-temperature RPCVD GaN for electronics applications and growing pipeline of potential RPCVD foundry customers
- RPCVD equipment scaling and partnership with AIXTRON for RPCVD evaluation RPCVD progressing well, implementation of G4 system expected early 2020.

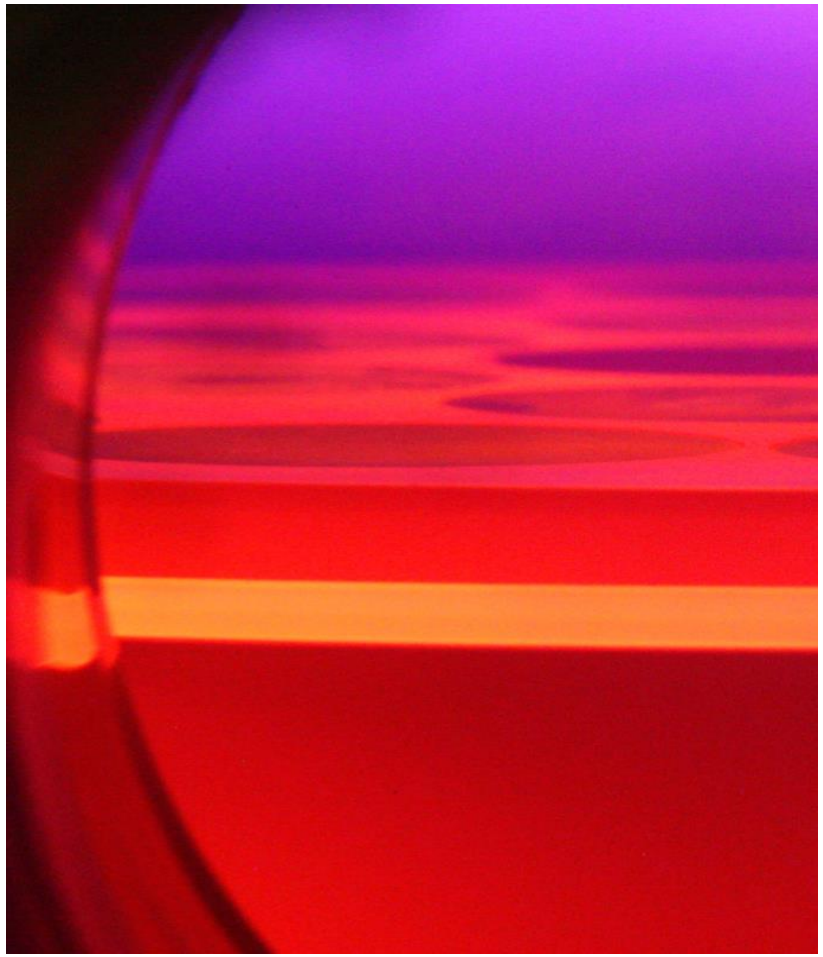




THE ACTIVE-AS-GROWN TUNNEL JUNCTION BREAKTHROUGH

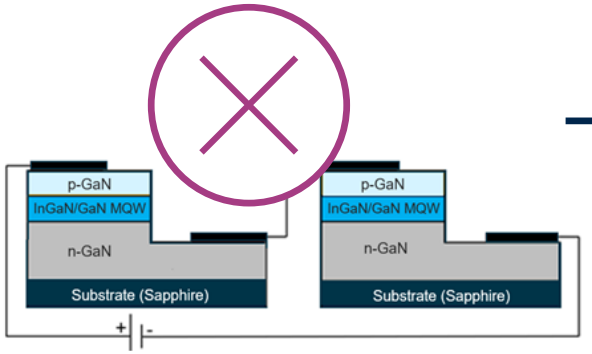
Standard n^{++} GaN/p^{++} GaN Tunnel Junction Requirements:

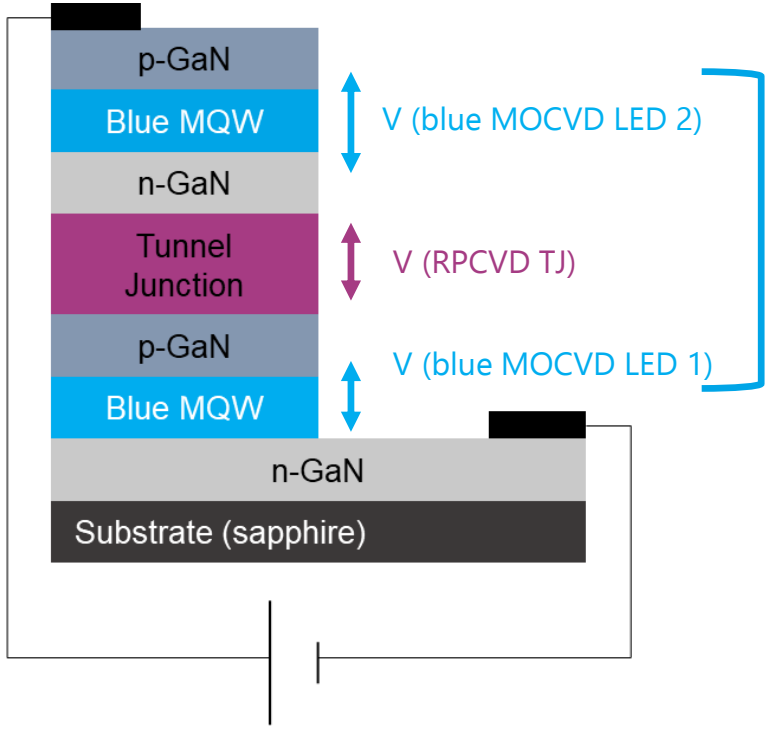
- ✓ Buried activated p-GaN (difficult to achieve with MOCVD without additional costly fabrication steps)
- ✓ **High doping capability** for both p^{++} GaN and n^{++} GaN
- ✓ **Sharp Mg dopant profile at tunnel junction interface** (difficult to achieve with MOCVD)
- ✓ **RPCVD has advantages for each of these key requirements** including our **'Active-As-Grown'** p-GaN capability for tunnel junctions



TECHNOLOGY BREAKTHROUGH – RPCVD TUNNEL JUNCTIONS

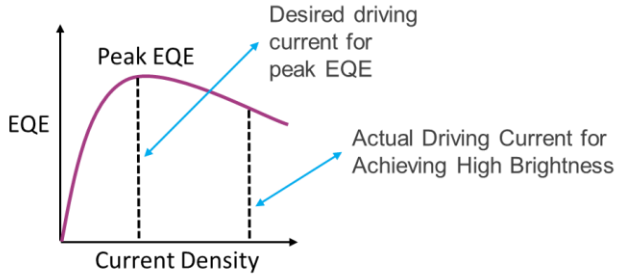
Successful demonstration of fabricated cascade LED devices with RPCVD tunnel junction





= Total Cascade Blue LED Voltage

Device	Forward Voltage (V)
Single Blue LED	2.9
Cascade Blue LED	7.7

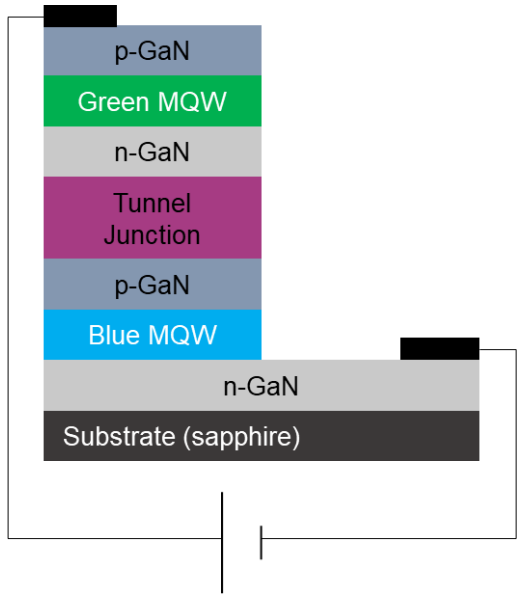


Side-by-side LEDs replaced with…

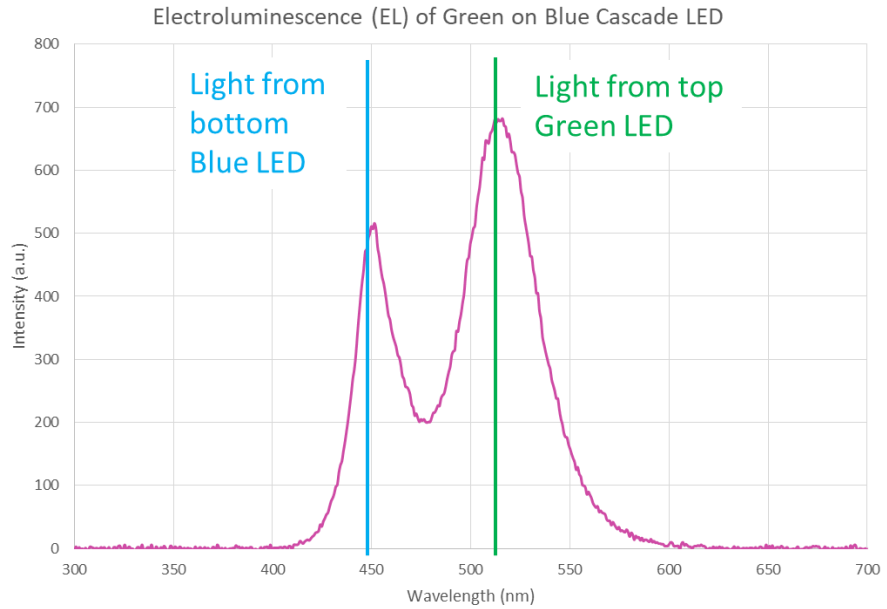
Single colour cascade LED: single device with two active regions, each emitting at the same blue wavelength

GREEN ON BLUE CASCADE LED WITH RPCVD TUNNEL JUNCTION

Proof of concept demonstrated



2-colour cascade LED. Single device with two active regions, each emitting at different wavelength. Only the tunnel junction is grown with RPCVD.



BluGlass wafer level LED quick test of Green on Blue Cascade LED. The emission spectrum shows two peaks, one from the blue active region and one from the green active region – the signature of a cascade LED.

RPCVD TUNNEL JUNCTIONS FOR LEDs – LATEST RESULTS

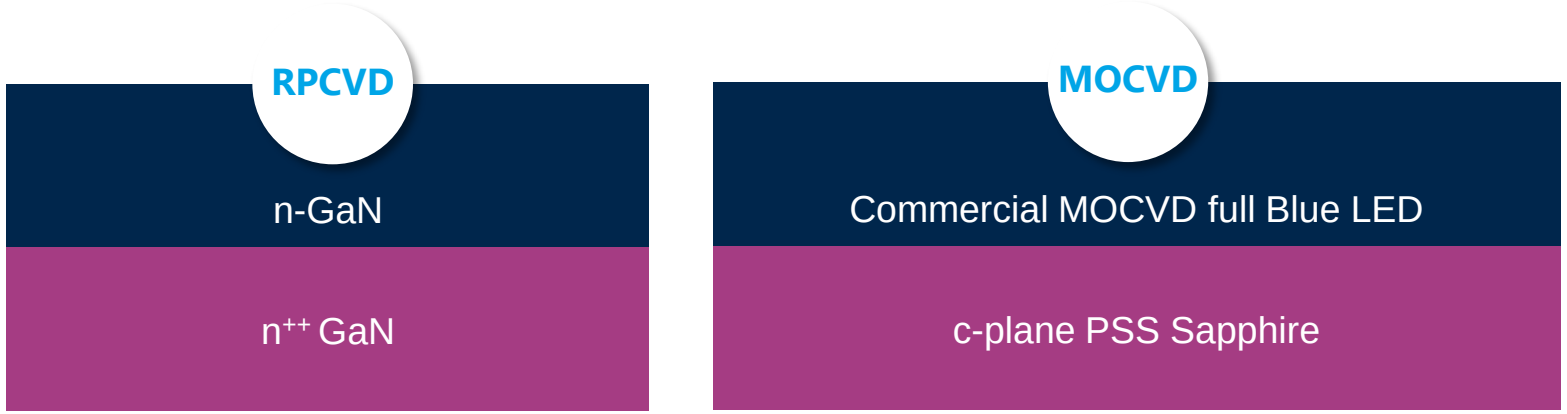
BluGlass has shown working RPCVD tunnel junction LEDs with improved light output when replacing the ITO contact.

Progress has been made in reducing the overall LED voltage, improving the light output and achieving good uniformity for 2" wafers – further reduction in Vf is still needed and is an area of focus for BluGlass.

LED with RPCVD Tunnel Junction	RPCVD LED data at 26 A/cm^2		
	Light output increase relative to all MOCVD LED	V_f (V)	Voltage increase due to TJ (V) relative to all MOCVD LED
Previous Result (single best point)	**+4.4%**	**4.06**	**+0.68**
Recent Result (average across a 2" wafer)	+7.0%	3.64	+0.67

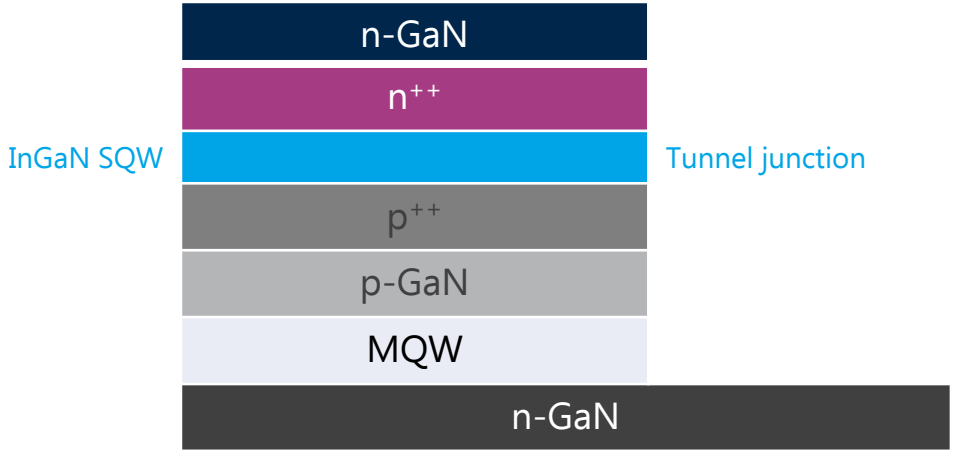
LED Processing details

- ITO thickness: 100 nm on reference full MOCVD LED & none on LED with Tunnel Junction
- Metallisation: Cr/Al/Pt/Au alloy
- Pad size: 100 ± 5 µm
- Chip size: 1140 x 1140 (± 25) µm^2



RPCVD TUNNEL JUNCTION UPDATE

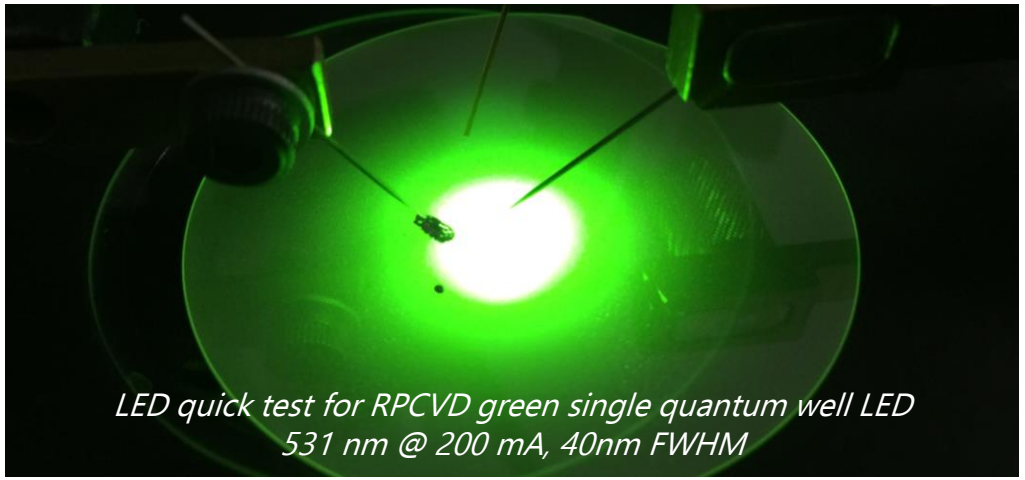
One approach to lower Vf: incorporating RPCVD InGaN in the tunnel junction



- Key demonstration achieved for RPCVD InGaN SQW
- Next step is to include in the best known RPCVD TJ process and fabricate into LEDs for testing

Polarisation engineered InGaN tunnel junction:

- Presence of InGaN layer induces polarisation effect that alters local electronic properties at the critical interface – leading to increase in tunnelling probability, reduction in voltage of the TJ
- High indium content InGaN single quantum well (SQW) has been successfully grown by RPCVD
- RPCVD can combine polarisation engineered InGaN SQW with highly doped p^{++} and n^{++} layers to reduce the depletion layer width even further to achieve much lower V_f



LED quick test for RPCVD green single quantum well LED
531 nm @ 200 mA, 40nm FWHM

RPCVD TUNNEL JUNCTIONS FOR LASER DIODES

One approach to lower Vf: incorporating RPCVD InGaN in the tunnel junction

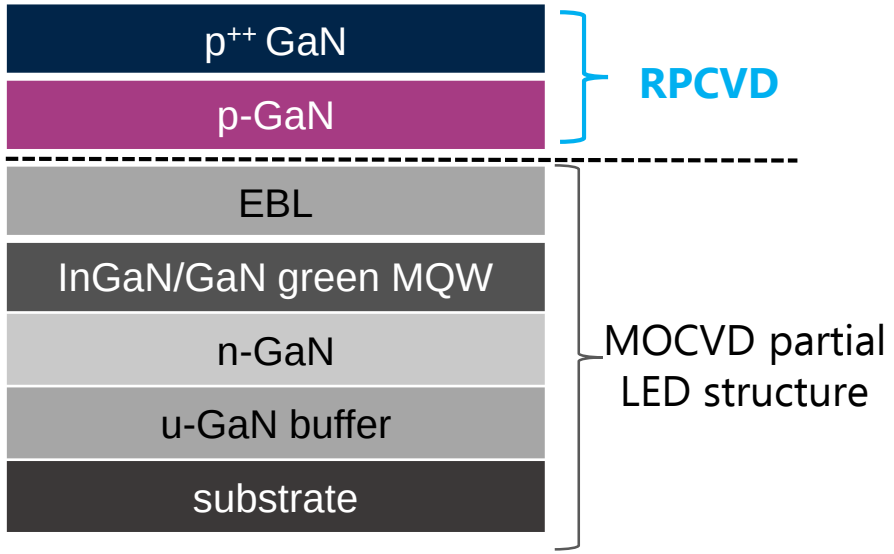
BLUGLASS LASER DIODE VALUE PROPOSITION: RPCVD-ENABLED DIODES

Description		RPVCD	MOCVD
Active-As-Grown (AAG) Technology	Unique technology advantage proprietary to BluGlass' RPCVD deposition technology	✓	×
Higher performing devices	• Higher LD brightness and efficiencies • Reduced optical loss • Lower contact and device resistance	✓	×
Productivity and cost improvements	New LD epitaxy design enables downstream process optimisation: • Fewer process/fabrications steps • Lower LD cost to end-user	✓	×
Unique Laser Diode Design	***RPCVD's Active As Grown*** p-GaN technology enables the use of tunnel junctions and n-AlGaN layers in the LD design • n-AlGaN layers can be used to efficiently confine the light within the laser diode; removes performance constraints currently inherent in laser diode devices by reducing optical losses and improving laser diode brightness and efficiency • RPCVD can deliver the tunnel junctions and n AlGaN layers at commercial wafer scales to deliver these laser diode performance advantages	✓	×
IP protection	RPCVD hardware and process technology and AAG epitaxial growth techniques for laser diodes are extensively covered by **68** patents within **9** patent families, with **15** new applications under way	✓	

CUSTOMER DEMONSTRATION OF RPCVD p-GaN FOR MICROLED DISPLAYS

X-Celeprint demonstrates a 2000 cd/m^2 microLED display using RPCVD p-GaN: showing good colour uniformity, quantum efficiency, and forward voltage.

RPCVD p-GaN LED Structure

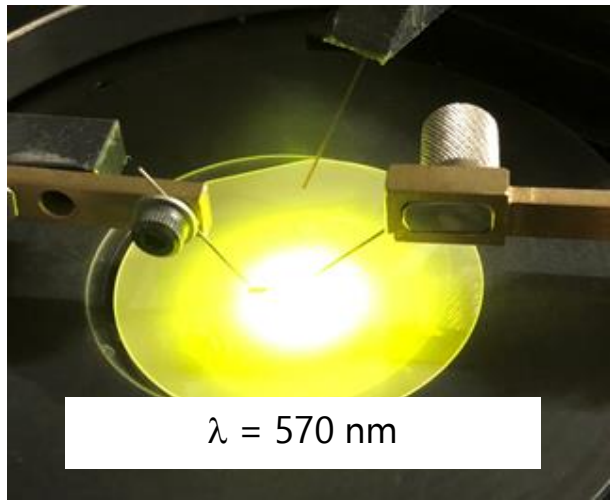


RPCVD MICROLED RGB APPLICATIONS

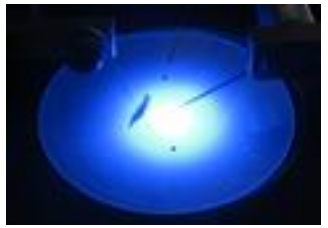
BluGlass continues to improve performance of its longer wavelength LEDs – critical for RGB microLED demonstrations for customers

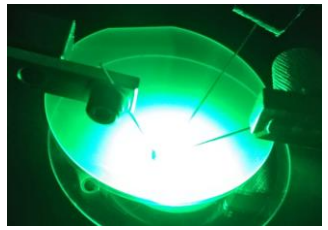
- Low temperature RPCVD p-GaN has significant potential to improve device performance in long wavelength LEDs – by overgrowing RPCVD p-GaN on indium-rich InGaN multi-quantum wells (MQWs)
- BluGlass is also developing the RPCVD multi quantum wells for longer wavelength LEDs such as green and red
- **BluGlass has multiple foundry customers using RPCVD p-GaN**

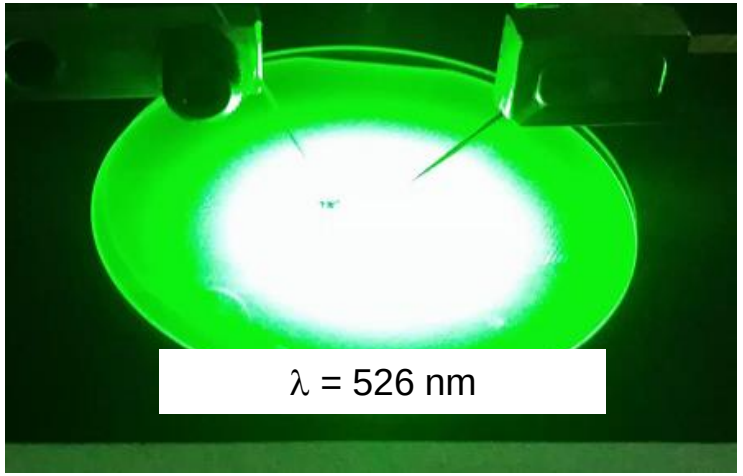
RPCVD p-GaN grown at low temperature

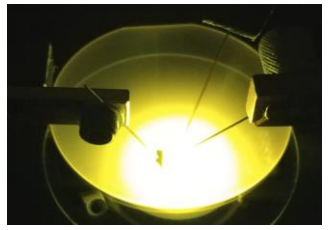


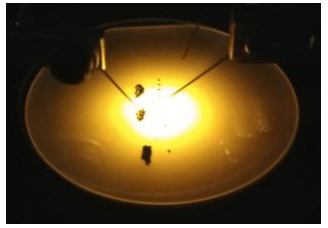
All RPCVD LEDs (p-GaN + MQW) grown on templates

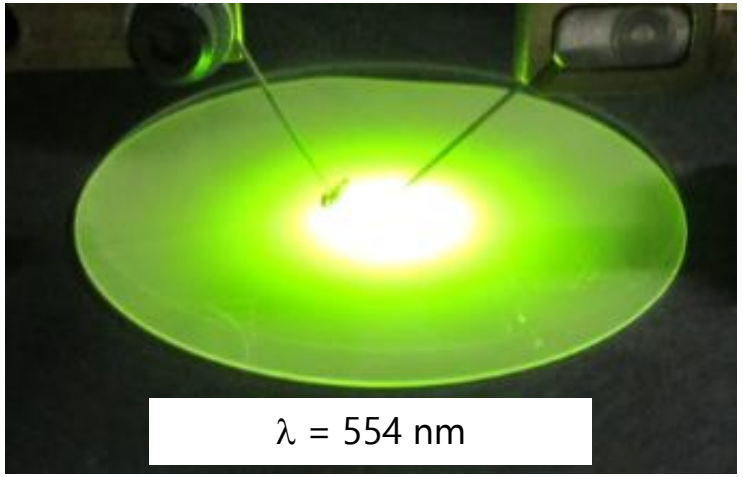












BLUGLASS FACILITY UPGRADE COMPLETED

Existing RPCVD & MOCVD Labs
(3 Prototyping Systems)

Use:
- 2 RPCVD system for process development
- 1 MOCVD system for custom epi services and RPCVD support

Output:
- IP generation
- RPCVD demonstrators
- Collaborations
- MOCVD custom epitaxial services

Production Bay 1 now in use
(1 x RPCVD System)

Use:
- RPCVD industry projects
- Support hardware and process development

Output:
- RPCVD project development ongoing and capacity for wafers and epitaxial services directly to customers

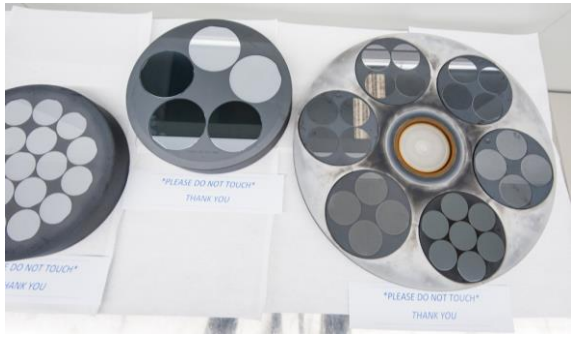
New Production Bay 2
(1 x Production Scale RPCVD)

Use:
- RPCVD scaling
- Demonstration of industry projects on production scale

Future Output:
- Demonstrate large scale RPCVD system – uniformity improvement.
- Design, build and sell retrofit RPCVD systems to customers

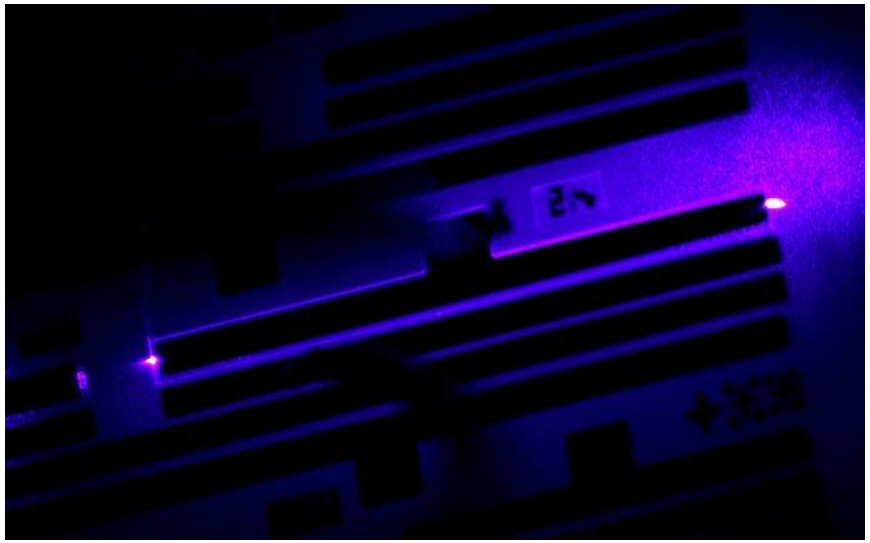
SCALING OF RPCVD TO THE AIX-2800 G4 WITH AIXTRON

- Internal and internationally supported gas flow modelling studies on AIXTRON G4 platform for RPCVD implementation have led to a preferred initial chamber design.
- The initial version of the upgrade seeks to use as many common parts as possible (to the existing MOCVD)
- Some standard features are not compatible with RPCVD, requiring specialist manufacture
- BluGlass working very closely with AIXTRON on several key components and software, with on-site training about to start
- **Expected commissioning of the RPCVD implementation is in early 2020.**

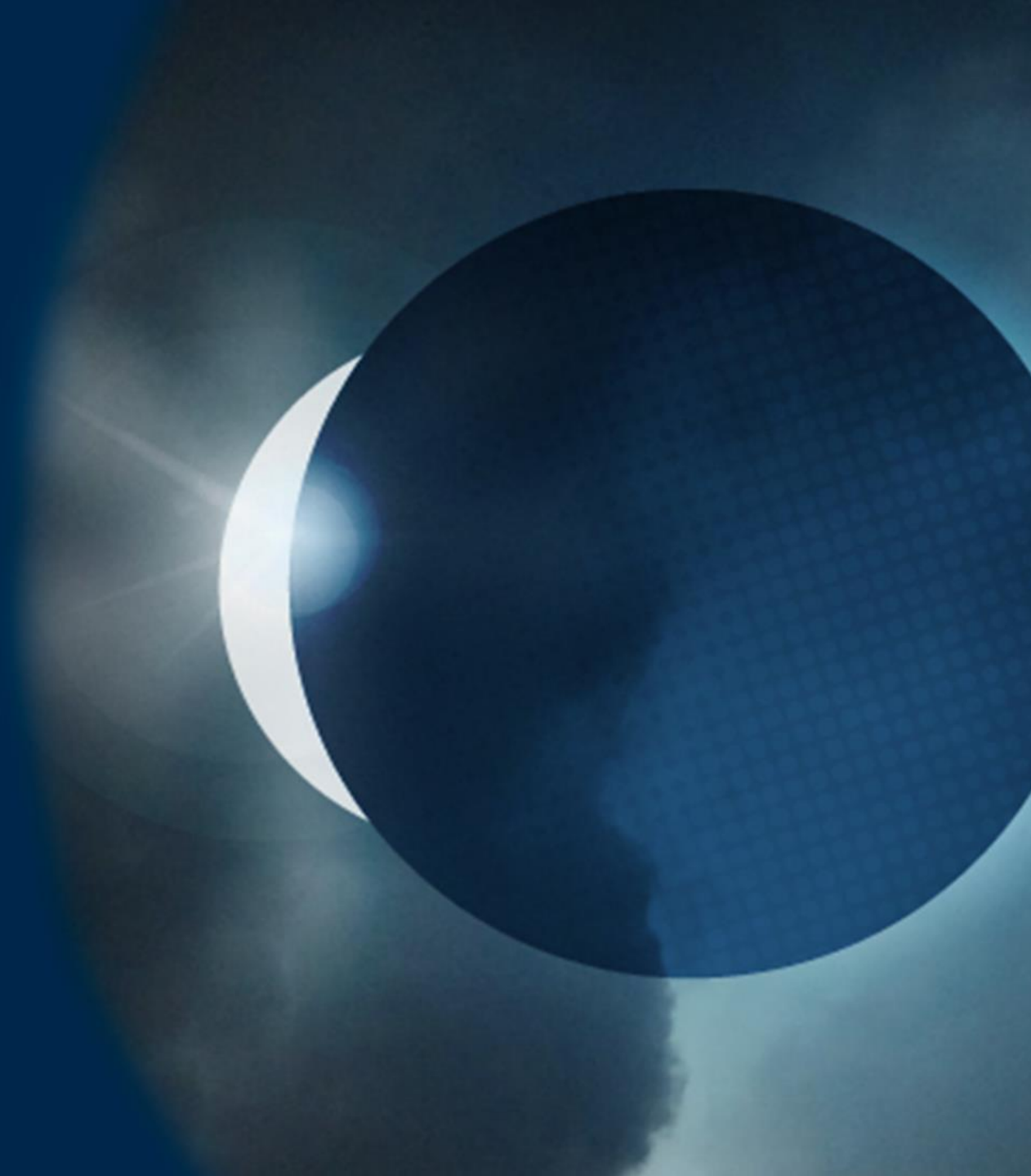


KEY RPCVD TUNNEL JUNCTION TECHNOLOGY SUMMARY

- Initial demonstration that RPCVD tunnel junctions can perform at high currents in a GaN laser diode structure
- First BluGlass demonstration of a fully-processed (chip on wafer), measurable, functioning cascade LED.
- Confirmation that BluGlass' Activated-As-Grown p-GaN capable of producing tunnel junctions for cascade LED applications
- Demonstration that critical tunnelling behaviour in the TJ persists after the additional LED growth is performed at MOCVD conditions – **a critical step**
- Initial demonstration that RPCVD tunnel junctions can perform at high currents in a GaN laser diode structure



QUESTIONS



APPENDIX: ADDITIONAL INVESTOR INFORMATION

www.bluglass.com.au

Entering the Global Laser Diode Market, October 2019

Path to Commercialisation, September 2019

FY2019 Annual Report, September 2019

Interview with CEO Giles Bourne on Finance News Network