



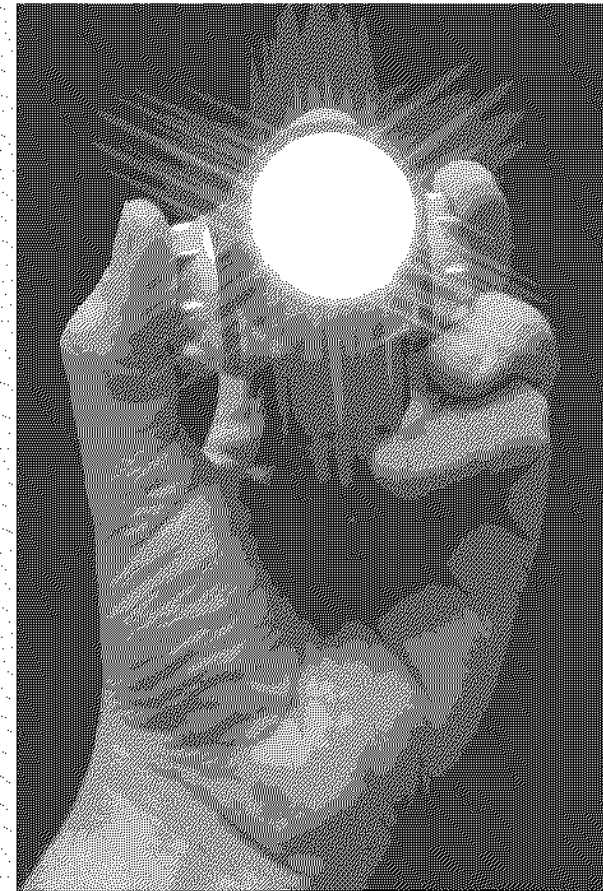
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# Investor Presentation

Update  
05 July 2007

# Presentation to Investors

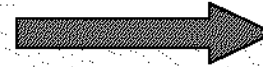
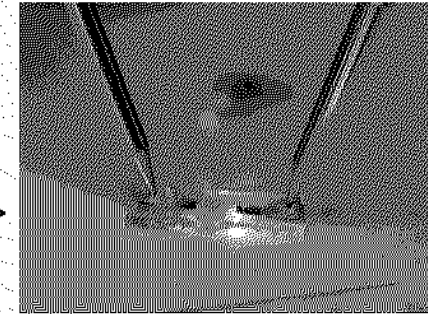
- Synopsis
- Business Profile
- Key Staff / Facilities
- Value Proposition
- Technology
- Market Outline
- Business Model
- Intellectual Property



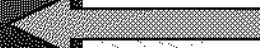
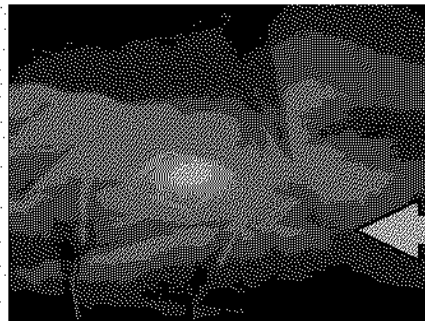
# Synopsis – Gallium Nitride and Solid State Lighting

The BluGlass business is based on the commercialisation of a novel technology for manufacturing low cost gallium nitride wafers

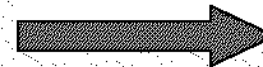
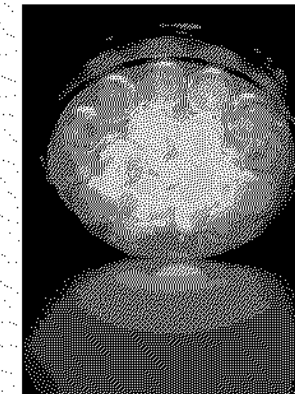
Gallium nitride (GaN) is a semiconductor material that electroluminesces (emits light) under applied dc voltage



GaN dominates the blue / green Light Emitting Diode (LED) & UV Laser Diode (LD) market



Environmental benefit underpins the potential for significant LED penetration of the general lighting market



## Business Profile

- Commercial spin off from Macquarie University, based on 10 years of fundamental physics research.
- A\$10M oversubscribed IPO in September 2006.
- One of the most successful ASX small cap listings in 2006.
- Strong international technical and commercial team.
- Near term focus on delivering commercial equipment and low cost GaN manufacturing technology to the global manufacturing market.

# Key Staff

- CEO - David Jordan
  - David has 25 years experience in business and academic environments, primarily in the silicon and photovoltaic industries.
- CTO – Dr Scott Butcher
  - Scott is the originator of the IP and a founder of the business. He has held senior research and commercial roles over 20 years.
- CFO – Geoff King
  - Geoff is a CPA with 25 years experience in multinational and Australian SME's, the past 15 year as finance director in manufacturing and service industries.

## New Facilities

- Based in Western Sydney in the suburb of Silverwater
- Commercial offices, research laboratory, workshop and semiconductor fabrication cleanroom
- Total facility 1,260 m<sup>2</sup>
- Clean room 356 m<sup>2</sup>
- Al / Ga / In deposition / photolithography / contact metalisation / reactive ion etching / device dicing / packaging



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# Value Proposition

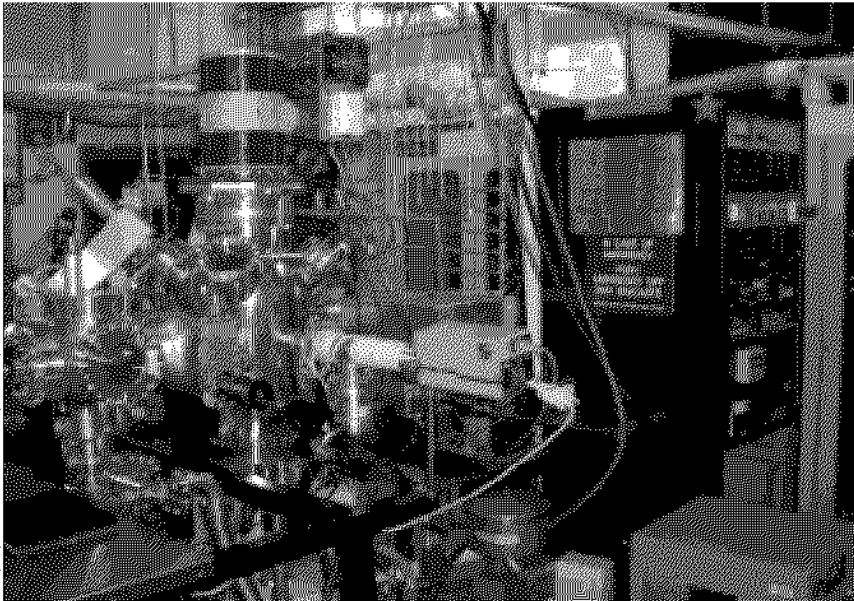
# Value Proposition

The BluGlass Remote Plasma Chemical Vapour Deposition (RPCVD) GaN manufacturing technology offers:

- **lower cost**
- **safer and more environmentally benign processing**
- **environmentally beneficial** end product (LED's)

# Value Proposition

## Remote Chemical Vapour Deposition



**Cost reduction benefits** over industry standard processing

- Low growth temperature
- Low cost substrates
- Zero use of ammonia
- Low material consumption
- Large area deposition

# Value Proposition

## BluGlass and the Environment

### ■ Environmental Safety

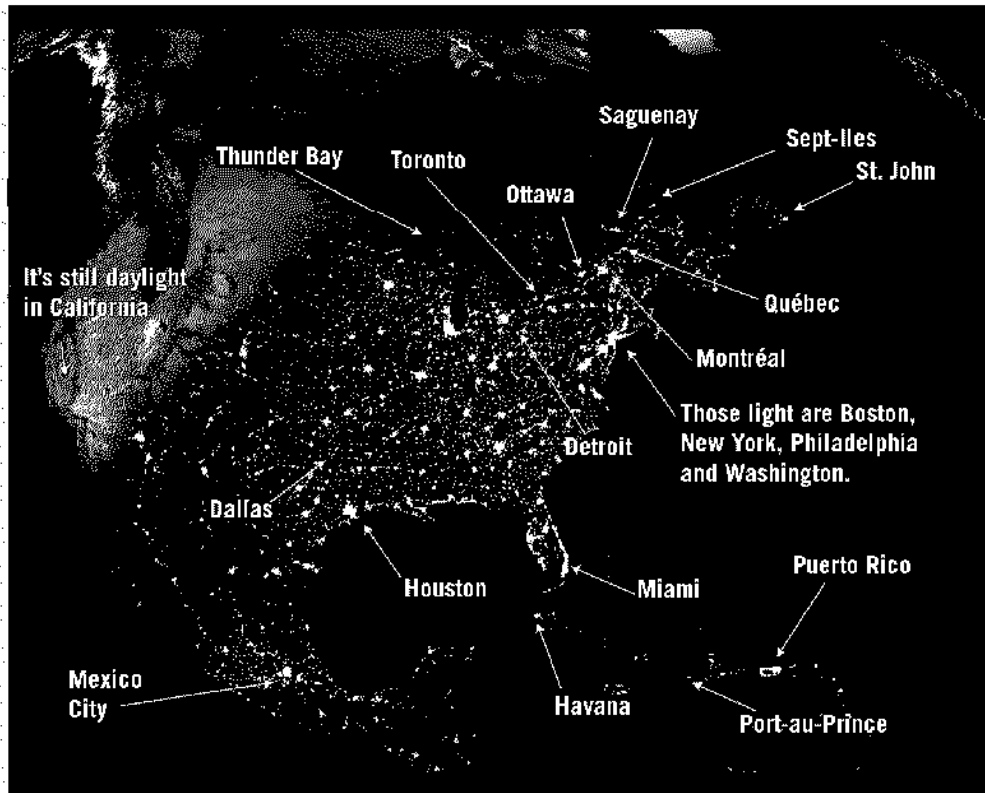
- ✓ Environmentally benign manufacturing process using no toxic ammonia
- ✓ LEDs contain no toxic materials (*cf* 4mg mercury in CFLs), and last up to 50 times longer than incandescents and 5 times longer than CFLs (*ca* 1,000 / 10,000 / 50,000 hours)

### ■ Product End Use

- ✓ If LEDs replaced inefficient incandescent bulbs globally over the next 25 years, the world would avoid the generation of 16 thousand million tonnes of CO<sub>2</sub> through electrical energy savings\*

\* International Energy Agency (IEA)

# Value Proposition



- Lighting is responsible for around 20% of all electrical energy (2,600 TWh pa globally)
- CFL's use up to 80% less energy than incandescent bulbs
- LEDs are currently as efficient as CFLs with potential to double this efficiency
- Widespread adoption of LEDs is limited by cost – something BluGlass aims to help overcome

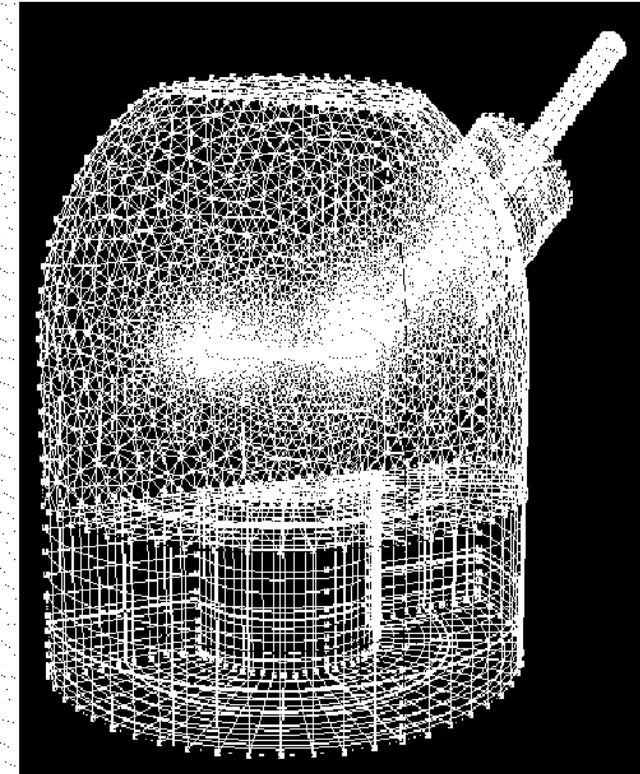


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Technology

## Remote Plasma (RPCVD) vs Metal Organic (MOCVD)

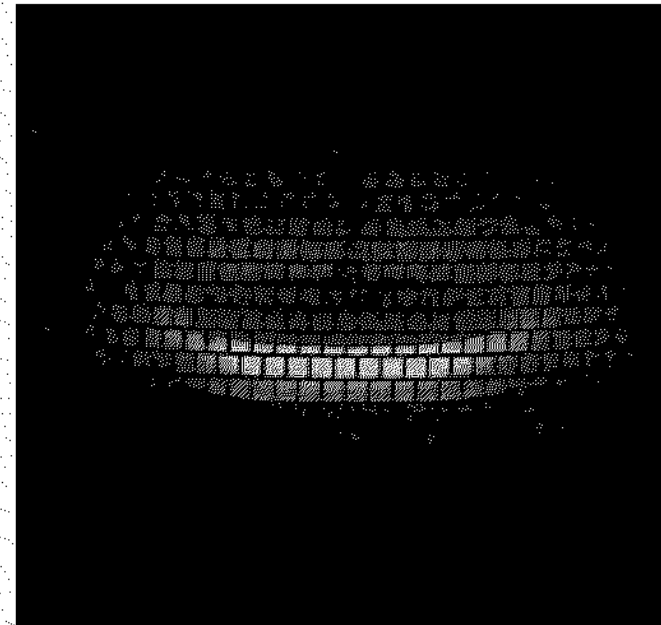
- RPCVD growth uses a N<sub>2</sub> plasma remote from the substrate in place of NH<sub>3</sub>, avoiding ion impact damage during film growth
- RPCVD requires process temperatures around 600°C, significantly lower than 1,000°C typical of MOCVD
- Low growth temperature allows use of low cost glass substrates in place of heat tolerant & expensive sapphire or silicon carbide



## 2" - 4" - 6" and beyond

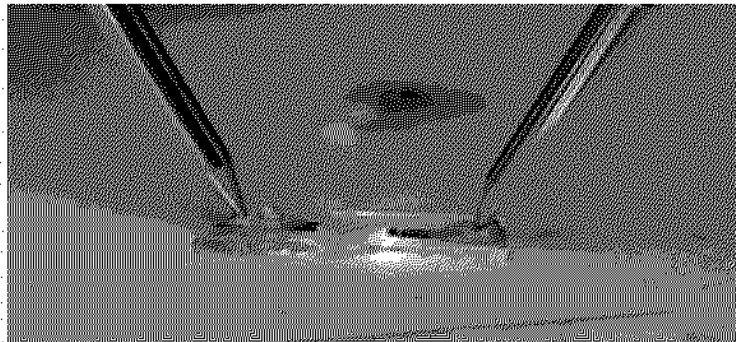
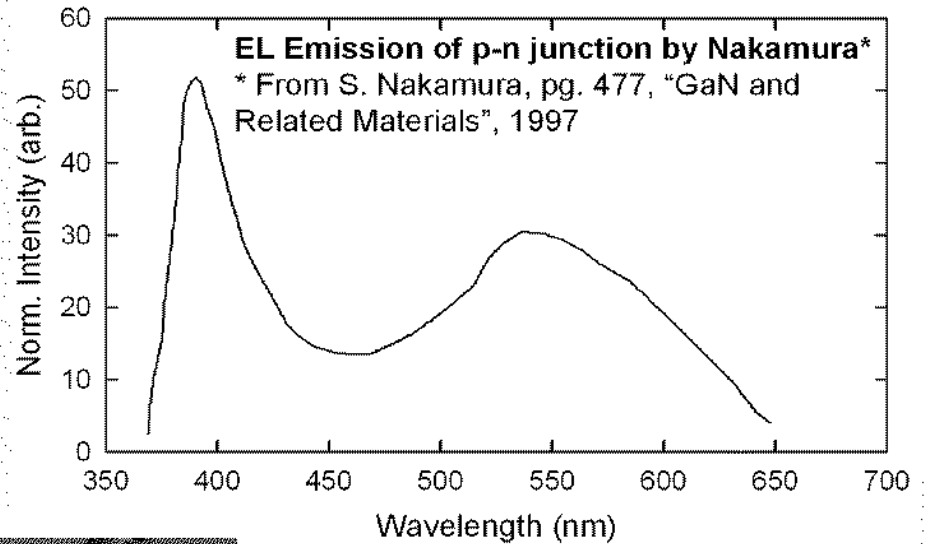
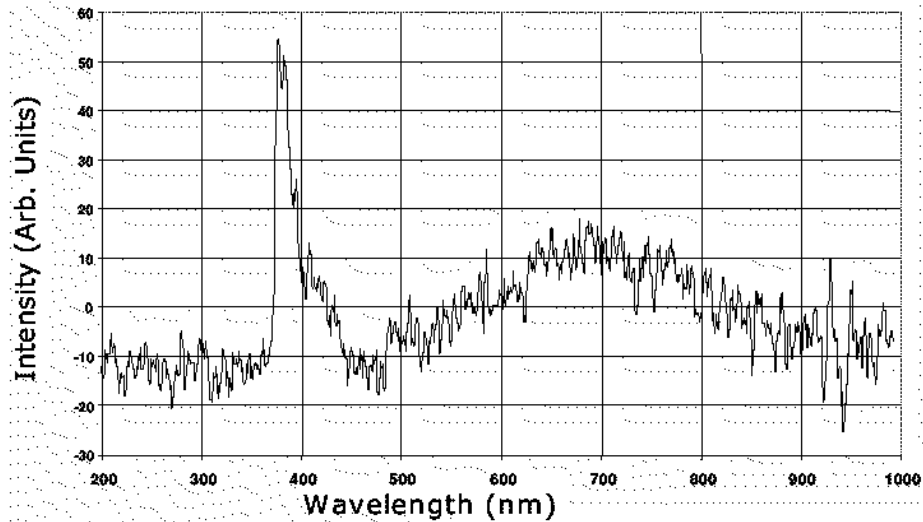
### Presently using a third generation in-house RPCVD system

- Current deposition standard on 2" & 4" substrates
- Less than 2% thickness deviation for GaN and InN over 4" deposition area
- GaN deposition over 6" area has demonstrated good uniformity and p-n junction diode electroluminescence.



# Electroluminescence – Simple p-n Junction LED

## Light Spectra of a p/n junction



# Electroluminescence - Heterojunction LED

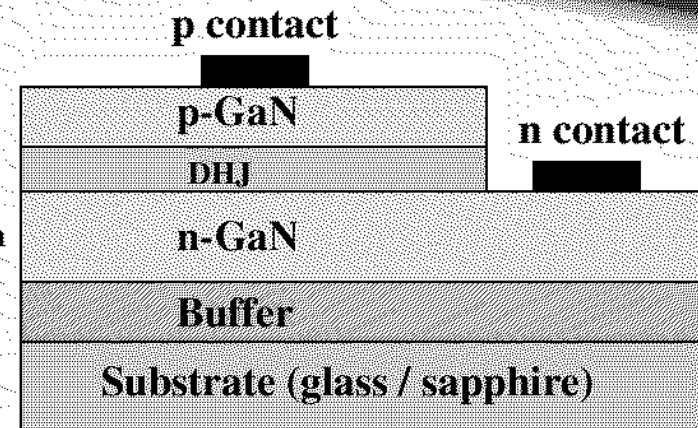


p-GaN, 150 nm

InGaN, 40 nm

n-GaN, 300 nm

ZnO, 140 nm



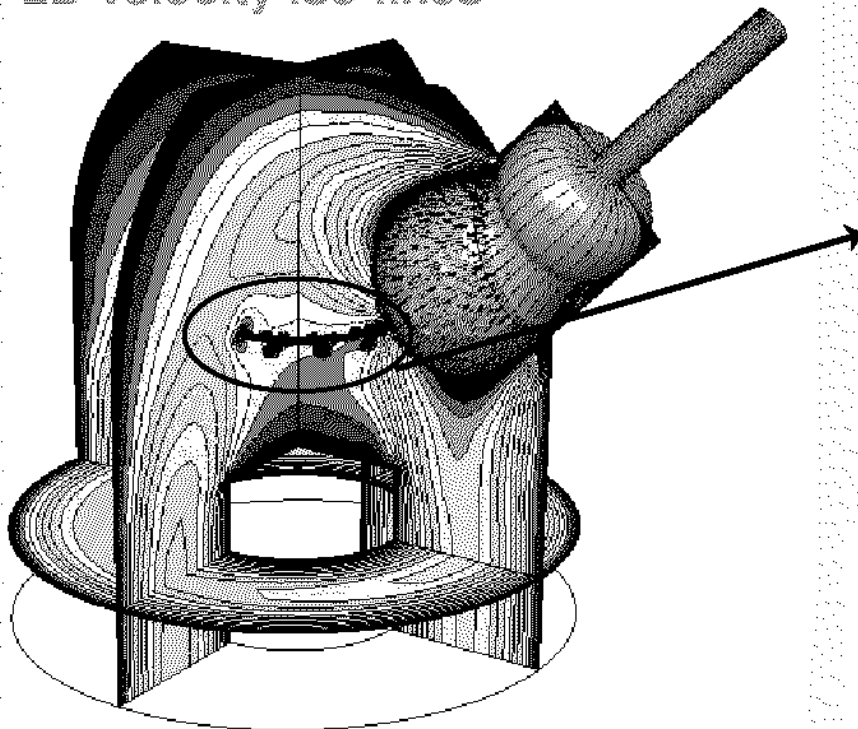
*Schematic not to scale*

- **The first RPCVD InGaN / GaN double heterojunction device on sapphire showed continuous visible blue light emission.**
- **Similar device structure on buffered glass showed blue emission (high  $R_{sp}$ , non optimised device structure).**
- **Complete structure grown at  $< 650^{\circ}\text{C}$  on both sapphire and glass**

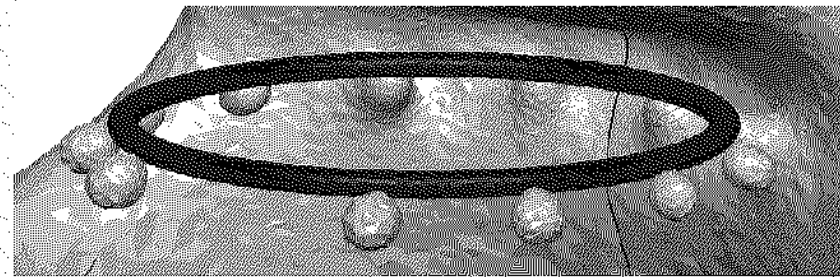
## CFD - Gas Flow Modeling

2D velocity iso-lines

3D iso-surface

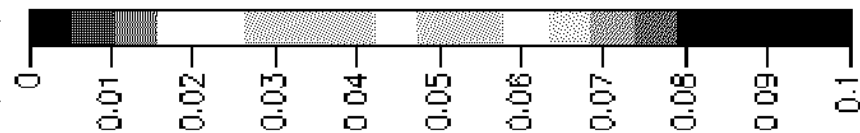


TMGa gas manifold



*Colour iso-lines are changes in velocity magnitude. 1 contour = 0.05 m/s.*

VelocityMognitude – m/s





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# Market Outline

# General High Brightness (HB-LED) Market

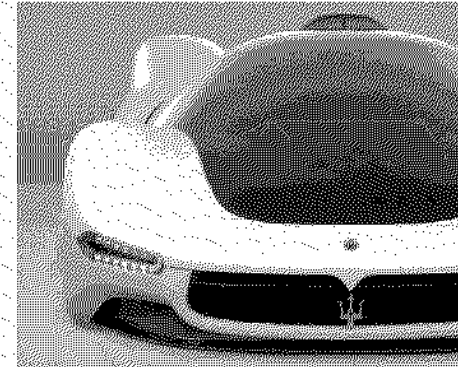
## Mobile Appliances

US \$2 billion or 12 billion units



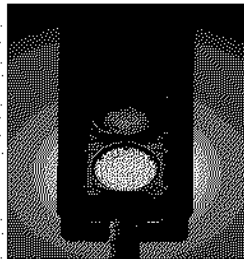
## Automotive

US \$500 million or 2 billion units



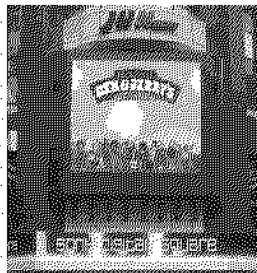
## Traffic Lights

US \$50 million or 116 million units

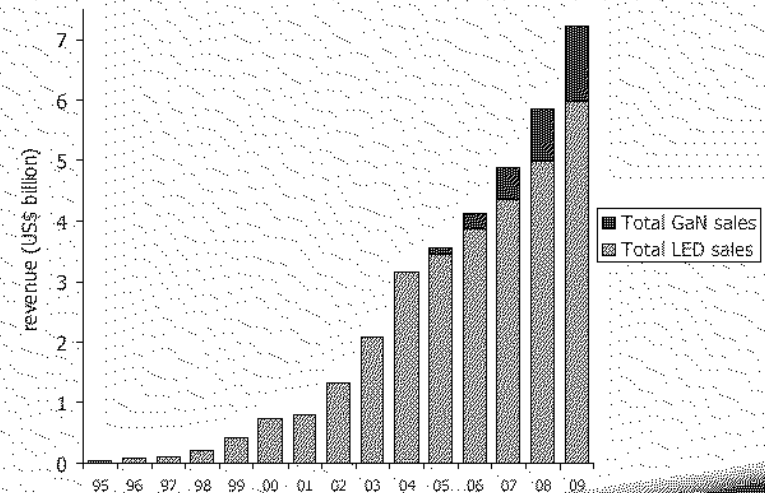


## Signage

US \$450 million or 1.4 billion units



## Expected Growth Scenario



# General Lighting

- Aside from the expanding market for HB LEDs, a new, much bigger opportunity is presented by the general lighting market, which has a current global market value of over US\$100 billion.



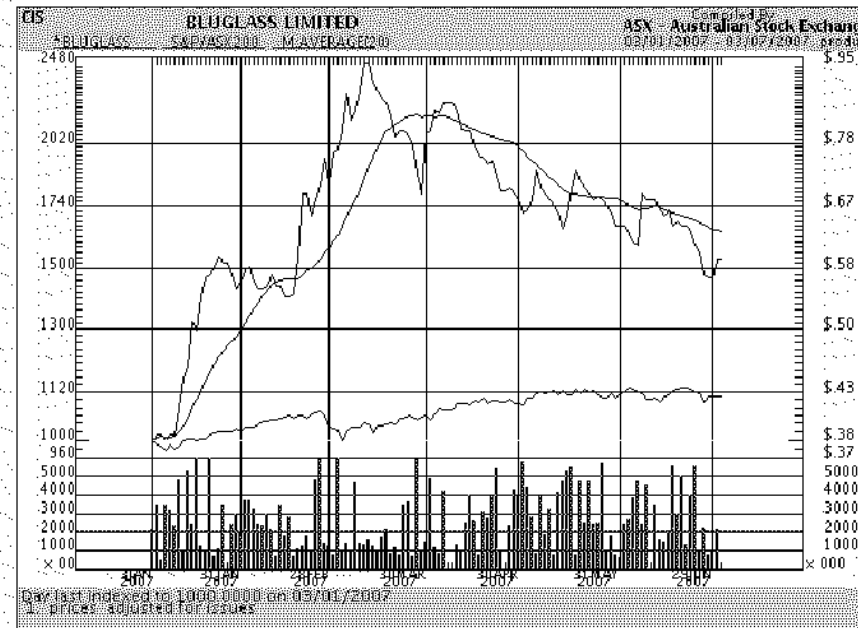
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# Business Model

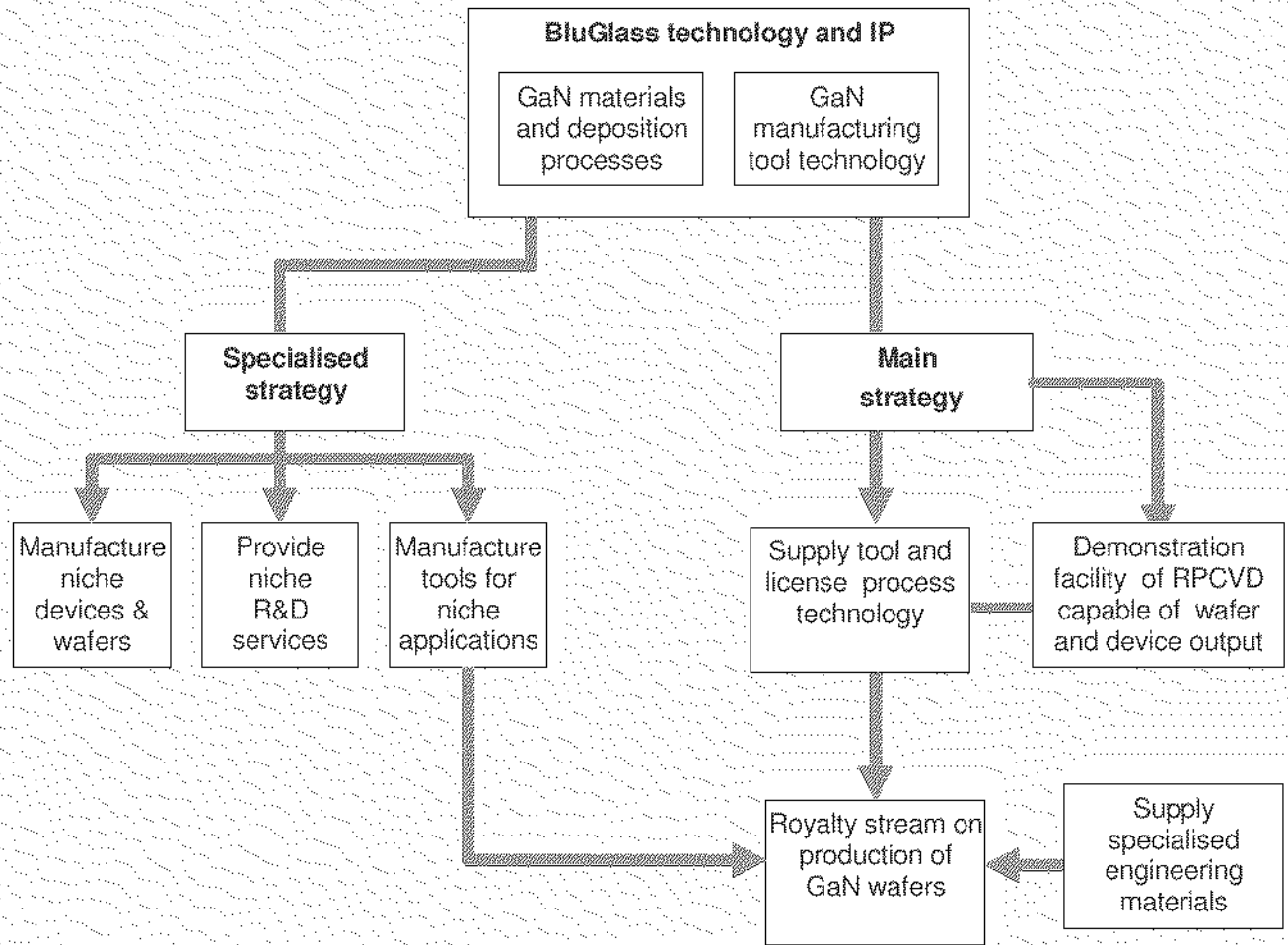
# Ownership Structure

Blend of shareholders – approx 160 million shares

- Macquarie University
- Major Corporate
- Founder Shareholders
- Small Investors
- Board / Employees



# Business Plan



# Business Plan - Key Aspects

## **RPCVD Tool Development**

Combine with major tool manufacturer to design, manufacture, sell, distribute and provide after sales service of a specialised BluGlass RPCVD tool.

## **License Epi-Wafer Production Process**

License manufacturing process including tool.

Royalty from each epi wafer manufactured.

Engineered substrates and specialised material supply.

## **Manufacture & Sell Niche Products**

Specialised wafers suppliers into specialised segments.

# Intellectual Property

## Strong IP position, reviewed by Blake Dawson Waldron

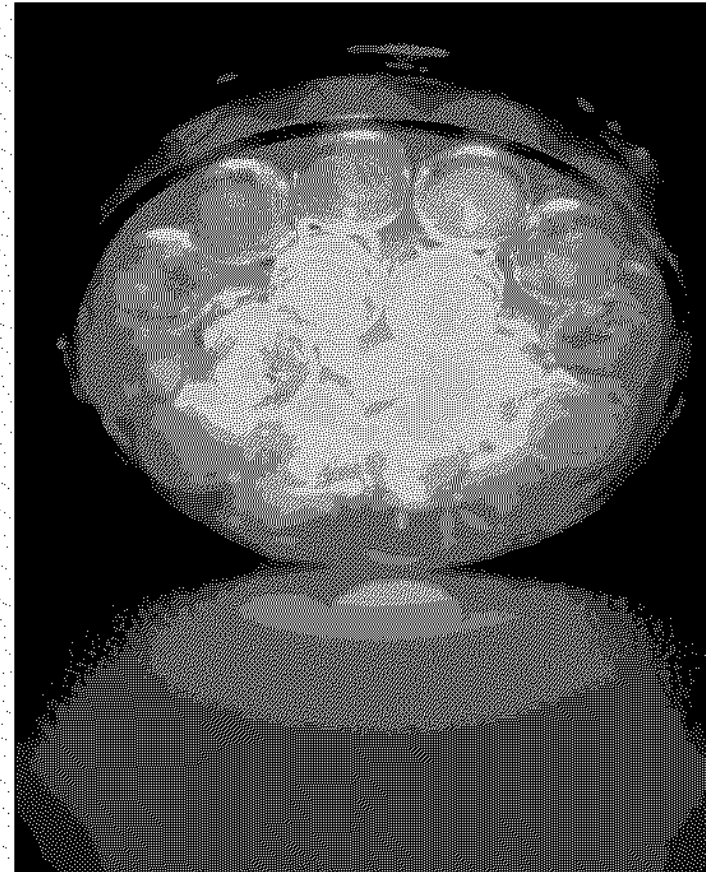
Two patents lodged in National Filing and a additional provisional patents lodged.

### National Filing Patents:

- Process for Manufacturing a Gallium Rich Gallium Nitride Film.
- Method and Apparatus for growing a group (III) metal nitride film and a group (III) metal nitride film

## In Review

- **Reduced manufacturing cost of GaN**
- **Two separate market segments experiencing strong growth**
- **Environmental benefit underpinning market growth**
- **Environmentally benign process**
- **Development of commercial RPCVD tool**
- **Potential near-term revenue streams**
- **Strong IP position**





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Thank you