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BluGlass demonstrates world-record single-mode GaN laser performance

Highlights

- BluGlass has demonstrated world-leading gallium nitride (GaN) single-mode laser performance
  - Showcasing a world-leading 1250 milliwatts of single-spatial mode power from a single chip, the highest known performance of a single emitter recorded to date both commercially and in academia*
  - The breakthrough performance was enabled by integrating BluGlass' single-mode blue (450nm) laser master oscillator with a power amplifier (MOPA)
  - Demonstrates a 67% improvement from the Company's previously reported 750 mW single-mode performance at Photonics West, January 2025
  - Quadrupled near single-frequency output from 100 mW to 450 mW in a distributed feedback (DFB)-MOPA configuration enhancing performance for high-precision laser applications
- High-power single-mode lasers are highly desired for high-precision, high-fidelity applications in quantum sensing, quantum computing, defence, aviation, and high-speed communications.

Global semiconductor developer, BluGlass Limited, pioneering advanced visible lasers for the quantum, defence, and biotech markets has demonstrated world-record performance of its single-mode gallium nitride (GaN) lasers, showcasing 1250 milliwatts of power from a single laser chip, while maintaining single-spatial mode. This is the highest known published result available, both commercially and in academia*.

This record performance was enabled by combining a blue (450nm) single-mode laser master oscillator with an integrated power amplifier in a single monolithic chip (SM-MOPA). The performance significantly enhances BluGlass' previously reported 750 mW single-mode performance by more than 67%, as published at Photonics West in January 2025[1,2].

BluGlass' high-power single-mode MOPA combines the benefits of a single-mode laser, and small form factor advantages for high-precision applications with the performance advantages of a high-brightness, high-power laser. This breakthrough offers crucial benefits for next-generation applications where precise and stable performance is essential for next-generation defence and aviation, quantum sensing and navigation, space and satellite communications, and underwater LiDAR.

BluGlass CEO Jim Haden said, "We have demonstrated the highest-known performing single-mode GaN laser in the world to date. These lasers pave the way for scaling power at high fidelity - producing stable laser beams that can be more easily and cost-effectively packaged to meet the demands of next-generation applications where precise and stable performance is essential.

"Most high-powered visible lasers sacrifice beam quality and precision to achieve more power in larger form factors. Our advanced integration capabilities will enable industry to pioneer innovations by increasing power without sacrificing precision and beam stability. We achieved these world-leading results by combining our blue

single-mode laser with a power amplifier that boosts the laser's power with minimal beam distortion or increase in noise.

"Single-mode GaN lasers are highly sought after for their high-precision and high-fidelity, despite being challenging to manufacture at high powers. The advantage of the monolithic chip design is significant, in that we can manufacture high-fidelity power and performance at the wafer level, drastically improving size, weight and cost for defence applications, and eliminating several downstream packaging steps. Our expertise in manufacturing these intricate lasers is one of BluGlass' key competitive advantages.

"In early January we published results showcasing 750 mW single-mode performance at the Photonics West conference. Three weeks later, we achieved 1250 mW, a 67% increase in performance, demonstrating rapid growth of our technology capabilities."

Further, BluGlass has more than quadrupled the power output of its distributed feedback (DFB) family of devices from the 100 mW range to 450 mW, since its Photonics West paper, published in January[2]. BluGlass' 450mW DFB performance while maintaining near single-frequency output and high side-mode suppression for enhanced signal-to-noise ratio, was achieved by combining a blue (450nm) single-mode DFB laser with an integrated master oscillator power amplifier, in a single monolithic chip (DFB-MOPA).

BluGlass' GaN DFBs are being designed for wafer-scale fabrication to reduce downstream optical complexity and cost, at the same time as addressing critical challenges in quantum technologies and computing while enabling greater production volume and smaller device sizes.

BluGlass' enhanced integration capabilities and device architectures are designed to address key application challenges and enhance power and versatility of visible GaN lasers where power, precision, and tunability are required.

"Our strategic focus on scaling power at high fidelity for the precision market – amplified single-mode and DFB lasers– that led to this world-record single mode visible power and the quadrupling of power in our narrow linewidth lasers is a direct response to market demand. Our ability to satisfy unmet market needs is why BluGlass continues to be selected as partner of choice by industry leaders, including the US Department of Defense's Microelectronics Commons" added Jim Haden.

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1. As announced to the market on 29 January 2025 in an announcement titled *'BluGlass showcases new product capability at Photonics West, files three new US patents'*.

2. BluGlass' Photonics West paper '*Advancements in GaN DFBs with embedded gratings and a path to higher power'* will be published by the International Society for Optics and Photonics (SPIE) in the coming weeks on the SPIE Digital library. BluGlass will make a link available on its website when available.

*****To the best or our knowledge, based on literature searches conducted by the University California, Santa Barbara (UCSB) and BluGlass, see references below.

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About BluGlass

BluGlass Limited (ASX:BLG) is a leading supplier of GaN laser diode products to the global photonics industry, focused on the defence, aerospace, quantum sensing and computing, and bio-medical markets.

Listed on the ASX, BluGlass is one of just a handful of end-to-end GaN laser manufacturers globally. Its operations in Australia and the US offer cutting-edge, custom laser diode development and manufacturing, from small-batch custom lasers to medium and high-volume off-the-shelf products.

Its proprietary low temperature, low hydrogen, remote plasma chemical vapour deposition (RPCVD) manufacturing technology and novel device architectures are internationally recognised, and provide the potential to create brighter, better performing lasers to power the devices of tomorrow.