

## LASER DIODES

# Is Osram ready for Nichia's lawyers?

By Rebecca Pool

Last month, a European firm took the brave step of entering the highly competitive and legally treacherous blue laser-diode market (*OLE* November p5). Osram Opto Semiconductor of Germany has manufactured a continuous-wave, room temperature 420 nm laser diode. But will it manage to stay out of the patent disputes surrounding blue laser diodes and bring its product to market?

**Performance is a problem**

The indium gallium nitride-based diode's output power and threshold current compares favourably with other commercially available blue laser diodes, but its operating lifetime of only a few minutes cannot compete.

Osram admits that the product is still in its research phase and the firm is working with scientists at Germany's Fraunhofer Institute for Applied Solid-State Physics (IAF) to adjust the device's composition and boost its performance.

In the meantime, Nichia continues to sue anyone who tries to dip a toe into the blue diode-laser market. While Nichia's lawyers keep other market players busy, could the ongoing court battles give Osram the time it needs to gain a lead on its competitors?

IAF's Joachim Wagner thinks not. He is working with Osram on the laser diode and believes that the dispute is blocking European entrants from the market. "[The patent dispute] doesn't totally



Osram seems to be taking Nichia on head-to-head in the blue laser-diode market.

inhibit our actions," he said. "But it does make things difficult."

Bob Steele, director of optoelectronics at US market analyst Strategies Unlimited, also thinks the dispute is hindering progress. "It's not a good thing for anyone," he said. "Nichia is suing everyone and too much money is being spent on lawyers instead of on research and development."

Indeed, just last month the firm filed its latest complaint against its rivals Rohm in Japan and Cree in the US. Nichia cited acts of conspiracy to exclude it from the US market and accused Rohm of fraudulently obtaining invalid US patents to inhibit its research. This is only one of a string of claims that have already been filed by the Japanese company.

But while the industry's key players fight it out for intellectual property rights and Osram plays catch-up, other contenders are finding their own ways of getting round the barrage of disputes.

Ian Watson of the Institute of Photonics, Strathclyde University, UK, thinks that those European

gallium nitride-based laser-diode contenders that are prepared to consider alternative strategies are the ones most likely to survive.

"The market has already been saturated by Nichia, so Europe cannot compete head-on," said Watson. "Therefore, [the smart] companies are looking into niche markets and are making products that offer added value."

Watson's group is skipping a product generation altogether to focus on more advanced concepts than Nichia's blue laser diode. "We are looking into making gallium nitride-based vertical-cavity surface-emitting laser devices and micro-LED arrays," he said. "Their applications could include microscopy for biological imaging, short-distance fibre communications and displays."

Matsushita of Japan has taken this strategy one step further and developed an alternative blue laser diode that is based on second-harmonic generation (SHG). Equipped with a non-linear optical crystal, the high-power diode converts 820 nm red laser light

into 410 nm blue laser light.

Watson believes that the SHG diode is likely to suffer from size and reliability problems and will prove to be merely a "stop-gap" technology. Although he concedes that costs could inhibit market penetration, Steele disagrees. "Matsushita intends to go after the high-density DVD optical-data-storage market," he said. "Because the firm is vertically integrated, it is in a position to use the diodes in its own products."

**Osram's options**

So while Osram attempts to rival Nichia's technology, other diode developers are working on innovative ways of avoiding the minefield of patent disputes.

The German firm now has two options: it can face Nichia head-on and be prepared to pay out for lawyers; or it can admit that it is too far behind to be competitive and try a different approach.

Osram refused to give an interview, but industry sources told *OLE* that the firm has invested heavily in equipment for gallium nitride manufacture. We also know that, as reported in last month's *OLE*, Osram has already entered into a patent dispute with Nichia concerning white LEDs.

So it looks as though Osram has chosen its course of action. Only time will tell whether its strategy will be successful and a European company will at last be able to make some progress in the blue laser-diode market.

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