

Mixing and matching

In this issue we highlight the promising developments being made in nitride-based materials and devices. On pages 25–33, we report how Cree's GaN-based white LEDs are now achieving a power output of 100 lumens per Watt (about 50% of the theoretical maximum), while GaN-on-silicon blue LEDs developed by Germany's Magdeburg University are now being fabricated on 150 mm diameter wafers by commercial spin-off Azzurro Semiconductors.

On pages 20–24, we cover last December's International Electron Devices Meeting (IEDM), which reported GaN-based HEMTs on SiC substrates from Toshiba and Fujitsu (the latter with record power output), as well as GaN HFETs on silicon from Nitronex and even AlGaIn/GaN FETs on silicon from Matsushita/Nagoya University of Technology as an alternative to silicon MOS and IGBT transistors in power-switching. GaN-on-Si therefore offers the prospect of integrating not only optoelectronics but also III-Vs microelectronics on silicon. (Using III-Vs in digital applications as silicon encounters size-scaling limits will be explored in the next issue.)

Perversely (given the historically mutually exclusive silicon/compound micro/optoelectronic divide), IEDM also focused on "Silicon Challenges Conventional III-V Light Emitters", reflecting 2005's advances in Si-based lasers. In the nearer term, on news pages 17–19, we report on funding for start-ups HexaTech and Fairfield Crystal Technology to develop commercially viable, larger-diameter AlN wafers, as the theoretically better matched substrate for nitrides than SiC and sapphire.

Of more immediate commercial concern, RF IC makers are experiencing significant sales growth, partly through higher-value products with increased semiconductor content. But even component suppliers not yet showing growth are returning to profit through cost-cutting measures such as transferring manufacturing to regions such as China and outsourcing to subcontractors. Apart from RFIC maker RFMD increasing its assembly capacity in China by 50% (see page 5), optical component makers have also been returning to profit (e.g. Bookham in the September quarter and JDSU in the December quarter, although Avanex has been thwarted by outsourcing glitches — see page 11).

Component makers have also been diversifying beyond fibre-optic telecoms to revive revenues. Emcore has "completed its broadband acquisitions" by buying K2 Optronics (for its external cavity lasers), targeting cable TV applications (page 10). Meanwhile, at January's Photonics West event in San Jose, both JDSU and Bookham branched out by launching products that use their telecoms-based laser technology in high-power lasers for industrial applications (see the next issue for an overview of trends at Photonics West). So, as well as mixing and matching III-Vs and silicon to optimise performance, manufacturers are having to mix and match device technologies to optimise markets.

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