Sitar also explained why intermediate AlGaN phases appear during the growth of AlGaN epilayers on AlN substrates. He pointed out that this low dislocation system allows the observation of a kinetically driven phase separation on the surface, which occurs due to strain. The extent of the separation depends on the temperature, growth rate and off-cut angle of the substrate.

During the conference many other groups reported results rela ted to these additional AlGaN phases. However, in most cases they arose in more dislocated systems, where surface kinetics are obscured by the effect of dislocations.

One of the highlights of the material session was the presentation by Bastien Bonef from UCSB, who showed both the beauty and the limitation of atom probe tomography. He argued that contrary to popular belief, atom probe tomography cannot be quantitative, unless it involves the use of a reference sample. Bonef also pointed out that the exact – and largely unknown – shape of the sample directly impacts the topology of the reconstructed profile.

Another talk in this session, given by Al Balushi from Pennsylvania State University, revealed that it is possible to form a two-dimensional layer of GaN between a SiC substrate and a graphene layer obtained thereon with a migration-enhanced encapsulation method. This is a triumph for GaN, as it can now replicate what has been accomplished with its BN cousin. It is not yet clear what applications may benefit from two-dimensional GaN, but its very high bandgap of 4.8 eV suggests that it has great promise in the UV. By undertaking precise transmission electron microscopy measurements, Balushi and co-workers observed how gallium atoms intercalate between graphene and the SiC, before reacting with ammonia to form a thin GaN layer with R3m symmetry.

Improvements in the visible...

Although academics dominated the conference, there

were plenty of presentations from those in industry. They included plenary speaker Guillaume Arthuis, President of BBRight, a French-based developer of laser projection technologies. Arthuis argued that lasers can revolutionise movie projection by lowering the power consumption compared to filtered xenon lamps. What's more, lasers can simplify 3D projection, and by separating the light source from the digital light projector, they can yield simpler, cheaper, and more reliable systems in movie theatres. However, the downside of laser projection is speckle, stemming from the high degree of coherence of the laser. Addressing this issue is not easy – so far the best solution, which is far from ideal, is to shake the screen.

Arthius will have been pleased to hear talks at the meeting describing recent improvements in visible semiconductor laser performance. Masahiro Murayama from Sony Corporation announced that the company's green lasers can now deliver a 1 W CW output at 530 nm, under a drive current of 1 A. This laser has a wall plug efficiency of 17 percent, and an estimated lifetime of over 20,000 hours. Another pioneer of powerful green lasers is Osram Opto Semiconductors. Spokesman for that company, Harald König, told delegates that its green 517 nm lasers can now produce 120 mW at 200 mA, with a wall plug efficiency of 11 percent. Increase the wavelength to 532 nm and wall plug efficiency falls to 6.5 percent.

Other developments in visible nitride emitters included impressive results on green VCSELs by a team including Xin Zhang, who is affiliated to Xiamen University. Zhang described a surface-emitting device that produced CW, room-temperature emission at 560 nm with a threshold of 780 A cm^{-2}. Meanwhile, Czesław Skierbiszewsk, from TopGaN and the Institute of High Pressure Physics at the Polish Academy of Sciences, revealed the use of tunnel junctions in MBE-grown blue lasers. These devices demonstrated a slope efficiency of 0.85 W/A. Erin Young from UCSB is pursuing the same goal of improving the laser slope efficiency by introducing a tunnel junction in her blue edge-emitting lasers and VCSELs. With this modification she obtained a seven-fold increase in the power produced by the VCSEL.

Moving further to the red, Yasufumi Fujiwara from Osaka University revealed that the addition of