Prof. Tim Ashley MA PhD CPhys FInstP

Appointments
Senior Fellow, QinetiQ
Technology Manager, Quantum Electronics and Sensor Technologies Group

Current activity and discipline
Tim Ashley's area of expertise is in the device physics, technology and application of narrow band-gap semiconductors, with the aim of utilising the fascinating and extreme properties of these materials in novel infrared and electronic devices. Contrary to all earlier assumptions, his group has shown that these devices can, in many cases, be made to operate with little or no cooling, thus radically opening up the range of application fields and generating the now widely recognised topic of 'HOT' technology.

Background and previous career
Tim Ashley joined QinetiQ, then RSRE after graduating from Cambridge University. His initial research involved First Generation infrared detectors (SPRITEs), the results of which were implemented directly into the production devices for UK Thermal Imaging Common Modules. This was followed by work on the theory and demonstration of techniques to raise the operating temperature of infrared detectors through suppression of non-radiative recombination processes. The success of this research led to the application of related techniques to other types of device to enable some of the valuable properties of narrow-gap semiconductors to be accessed at or near ambient temperatures. This has included 'negative luminescent' IR LEDs and ultra-high speed, low power dissipation transistors based on indium antimonide - now being developed in collaboration with Intel for potential future use in microprocessors.

Current research topics also include extension and development of the technology to single electron (nano-electronic) and spintronic devices for applications including quantum information processing, ultra-low power consumption circuits, single molecule sensors and frequency agile infrared detectors.

He was awarded the Institute of Physics Paterson Medal and Prize in 1997, and is a visiting Professor at the University of Surrey and Imperial College London. He has over 100 open publications and 16 patents granted or pending in the fields of infrared detection, negative luminescence and infrared sources, fast transistors and molecular detection.

Illustrative publications

1. T. Ashley and N. T. Gordon, 'Higher operating temperature, high performance infrared focal plane arrays', *Proceedings of an invited paper presented at SPIE Photonics West, San Jose, January 2004. Proc. SPIE,* **5359**, 89 (2004)
2. T. Ashley, A. R. Barnes, L. Buckle, S. Datta, A. B. Dean, M. T. Emeny, M. Fearn, D. G. Hayes, K. P. Hilton, R. Jefferies, T. Martin, K. J. Nash, T. J. Phillips, W. H. A. Tang, P. J. Wilding and R. Chau, 'Novel InSb-based Quantum Well Transistors for Ultra-High Speed, Low Power Logic Applications', *presented at International Conference on Solid-state and Integrated Circuit Technology (ICSICT), October 18-21 2004, Beijing, China.*
3. T. Ashley, N.T. Gordon, G.R. Nash, C.L. Jones, C.D. Maxey and R.A. Catchpole, 'Long-wavelength HgCdTe negative luminescent devices', *Appl. Phys. Lett.*, **79**, 1136 (2001)

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