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New frontiers in monolithic, tunable, mid-infrared lasers

The mid-infrared spectral region (3-12 mm wavelengths) is strategic for many applications, such as chemical and biological spectroscopy, free space communcations and infrared countermeasures. Commercial systems designed to explore these applications are limited, in part, by the availability of high performance sources. For many of these applications, the definition of high performance includes the ability to rapidly cover a wide spectral region. This is especially important for chemical sensing, which can show improved specificity as the number of discretely measured wavlengths increases. While systems with multiple lasers sources can often cover a wide spectral region, this approach is extremely complicated and expensive to implement. Through advances in heterogeneous emitter gain medium deisgn, however, broadband tunable lasers can now be implemented on a single chip. Inherently compact laser architectures have been developed which do not require external feedback for tuning. The motivation for this effort is to eliminate as many external optical components as possible, which significantly reduces system size, weight and power (SWaP). In addition, production on a wafer scale can also reduce costs associated with component production and assembly. In this talk, some of the exciting new avenues of mid-infrared lasers will be described. This includes a description of how an arbitrary gain profile can be acheived, mechanisms for broadband electrical tuning and how to boost power to over a watt with on-chip amplification.

Biography

Steven Slivken has completed his PhD in Solid State Engineering in 2002 from Northwestern University. He is currently working as a Research Associate Professor within the Center for Quantum Devices at Northwestern Univeristy. His interests are in quantum optoelectronic devices including quantum cascade lasers. He has published more than 90 papers in reputed journals.

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