Abstract Submitted
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Multi-Color Nanowire Photonic Crystal Laser Pixels[1] JEREMY WRIGHT, SHENG LIU, GEORGE WANG, QIMING LI, ALEXANDER BENZ, DANIEL KOLESKE, PING LU, Sandia National Laboratories, HUIWEN XU, LUKE LESTER, The University of New Mexico, TING LUK, IGAL BRENER, GANAPATHI SUBRAMANIA[2], Sandia National Laboratories — Emerging applications such as solid-state lighting and display technologies require micro-scale vertically emitting lasers with controllable distinct lasing wavelengths and broad wavelength tunability arranged in desired geometrical patterns to form "super-pixels." Conventional edge-emitting lasers and current surface-emitting lasers do not produce a viable solution as they require abrupt changes in semiconductor bandgaps or cavity length. Here, we successfully address these challenges by introducing a new paradigm that extends the laser tuning range additively by employing multiple monolithically grown gain sections each with a different emission center wavelength. Using broad gain-bandwidth III-nitride multiple quantum well (MQW) heterostructures and a novel top-down nanowire photonic crystal nanofabrication we obtain single-mode lasing in the blue-violet spectral region(Sci.Rep,**3**,2982(2013)). This has a remarkable 60 nm of tuning (or 16% of the nominal centre wavelength) that is determined purely by the photonic crystal geometry. This approach can be extended to cover the entire visible spectrum.

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