

Single mode interband cascade lasers for petrochemical process monitoring

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Mid-infrared interband cascade lasers (ICLs) fabricated on GaSb are used for petrochemical sensing as they emit in the 3 - 5 μm spectral band which is of particular interest for methane, ethane, carbon dioxide, etc [1]. In order to correctly identify the gases present in a sample, single mode emission is necessary and, in fact, distributed feedback (DFB) ICLs are commercially available now [2]. However, the fabrication techniques required to achieve this are expensive and time consuming. Using the slotted laser design; a novel technique for ICLs and this spectral band, the device performance can be optimized to achieve higher output power and reduce optical losses while minimizing processing costs.

The waveguide design will involve etching slots with spacing much greater than the wavelength allowing for photolithography to be used in the fabrication as opposed to e-beam lithography. This technique is routinely used to produce single mode lasers on InP based systems [3]. GaSb based ICLs have a much thicker structure than InP based lasers and this presents some challenges in modifying the process used to create the slotted structures. Preliminary design simulations are shown in Fig. 1.

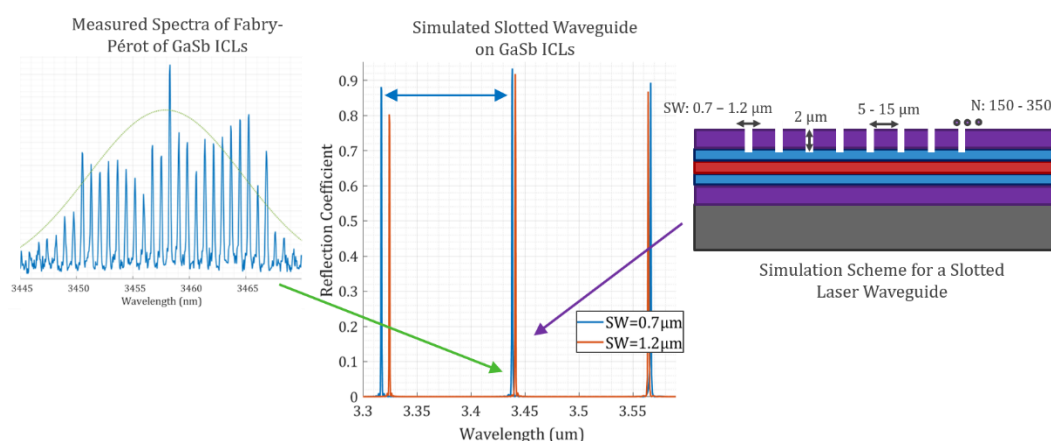


Figure 1. Slotted laser design to move from a multimode device to a single mode device for different growths

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References

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