



See Poster 12 !

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# Etching Rate Studies for Quantum Cascade Laser Mesa Formations

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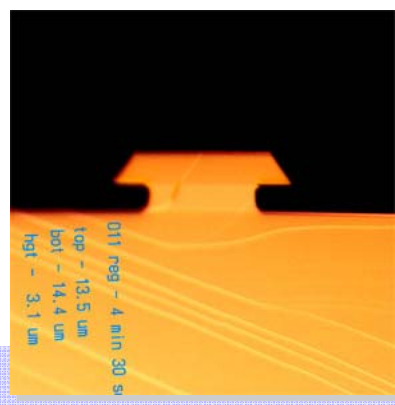
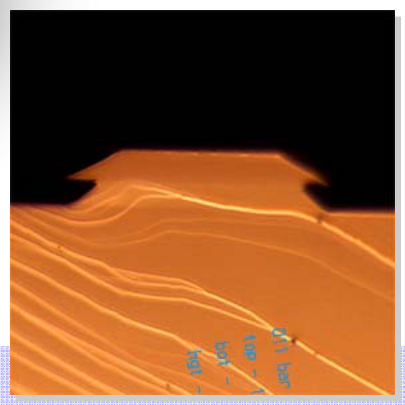
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As Quantum Cascade Laser (QCL) *research* moves inevitably toward QCL *manufacturing*, it is increasingly important to develop **repeatable manufacturing methods.**

These include:

- QCL Growth
- Wafer Processing
- QCL Testing

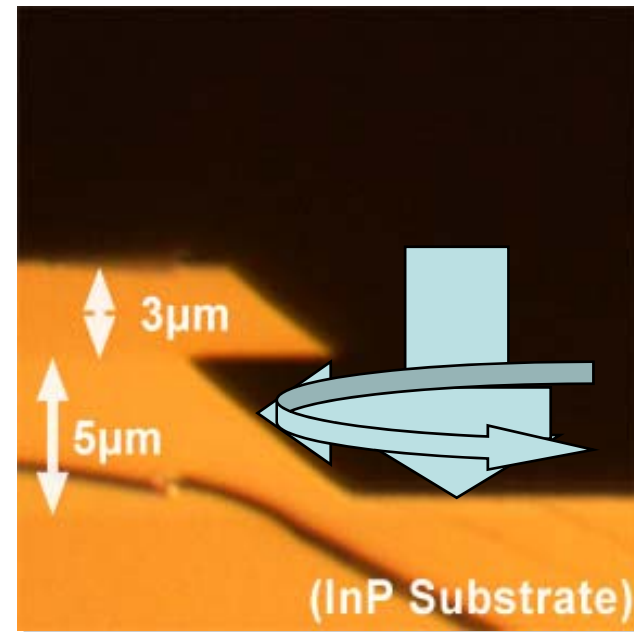
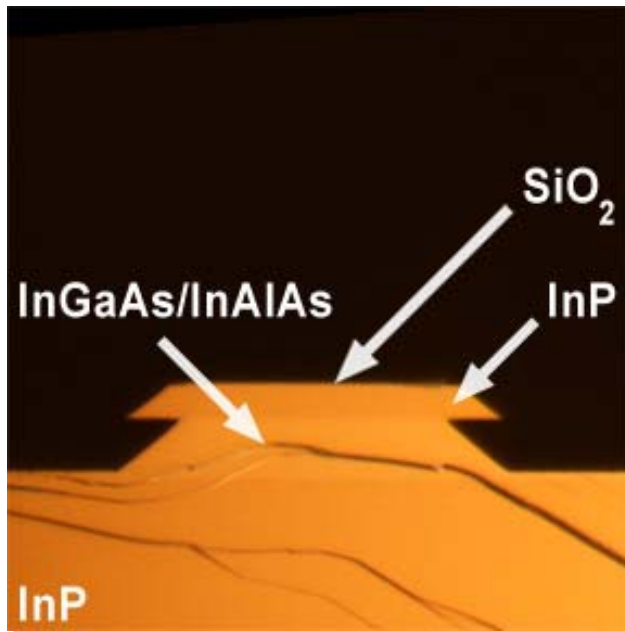
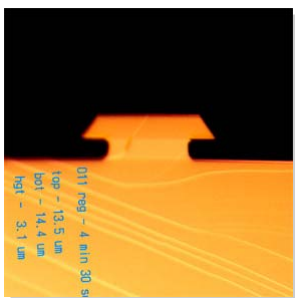
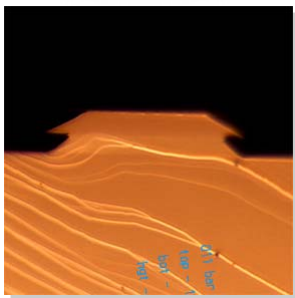
Our research focuses on characterizing chemical wet-etching rates and profiles for InGaAs/InAlAs QCLs grown by MOCVD. Regrowth & Device Assembly. Method & Inspection.



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## Etching Detail



Example: (011-Bar) Orientation

Wet-etching is a multi-step process involving variable, predictable etch rates.



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## Summary

Controlling chemical wet-etching parameters is *critical* for establishing reproducible Quantum Cascade Laser manufacturing methods.

Operators should carefully consider:

- Crystal Orientation of QCL mesa being etched (ie. 011 or 011-bar)
- Chemical Concentrations
- Etching Rates for different QCL designs
- Side-wall Profile Desired (see: “Etching & Regrowth of QCLs”, Liwei Cheng, UMBC)
- Overlay Design (ie. InP / SiO<sub>2</sub>)
- Wet-etchant Component Lifetimes (ie. H<sub>2</sub>O<sub>2</sub>)
- Etch Time Intervals (evidence of etch efficacy “ramp-up” exists)

**Thank you for your attention!**  
**Please visit Poster # 12 !**

