**PAPER OUTLINE**

# TITLE

(111) InP SUBSTRATE REMOVAL FROM (111) GaAs QUANTUM DOTS BY SELECTIVE ANISOTROPIC WET ETCHING.

# ABSTRACT

Tensile strained (111) GaAs QD are good candidates for single photon emitters. A key to characterizing the quality of the quantum dots as single photon emitter requires characterization by statistical time correlation methods wherein there is a measurable amount of time separating photon emission (a phenomena called photon anti-bunching). A challenge to this is the loss or decorrelation of photons that are emitted down through the substrate as opposed to into a PL detector. We will try a succinic acid and a citric acid solution and report the etch rates in the (110) , the (111) and the (100) directions.

# INTRODUCTION

There are reported etch rates for these materials and the selectivity between the etching of GaAs and AlAs. This selectivity is crucial to not destroying the QDs during the etching process.   
However, most of the reported values are from etches done down the (100). For these Zinc Blende materials, this is a less symmetric crystallographic direction than our (111) materials will face during the etch experiments, and it is unknown how much slower the materials will etch in this high symmetry directions.

# METHODS

We will grow samples of AlAs and and GaAs using Molecular Beam epitaxy on the 100, the 110 and the 111.

We will then add a region with a etch resistant material to part of the samples. We will then etch the samples for 3 minutes and Use a profilometry to measure the step down height between etches.

# RESULTS

The results will be reported etch rates for these etchants in these crystallographic directions.

# DISCUSSION

These etch rates can be used to recommend processing for our QD devices. Further work could be down computationally to support this. The selectivity of an etchant for GaAs over AlAs could be studied through a combination of kinetics and quantum mechanical calculations of the readiness of these materials to form complexes with out various etchants.

# CONCLUSION

# Could recommend etching uses bases on the obtained rates.

# REFERENCES

https://doi.org/10.1088/2515-7647/abf24e

<https://doi.org/10.1016/S0927-796X(00)00027-9>