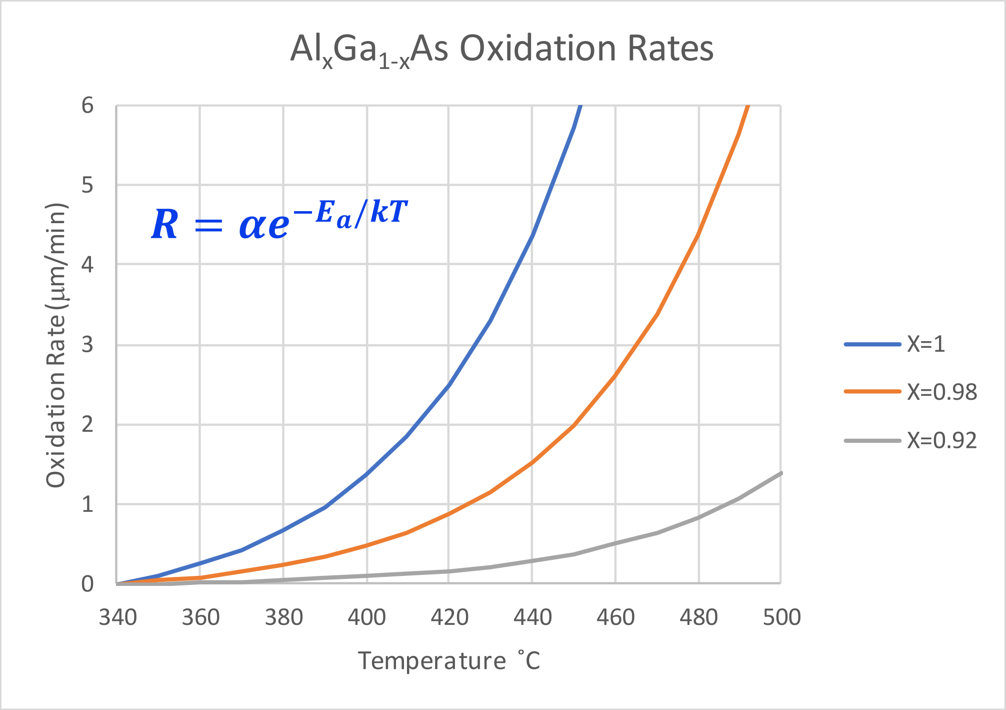
Lateral Oxidation-Rate Factors

for AlGaAs Layers

- Temperature
- Layer Thickness
- Geometry
- AlGaAs Composition

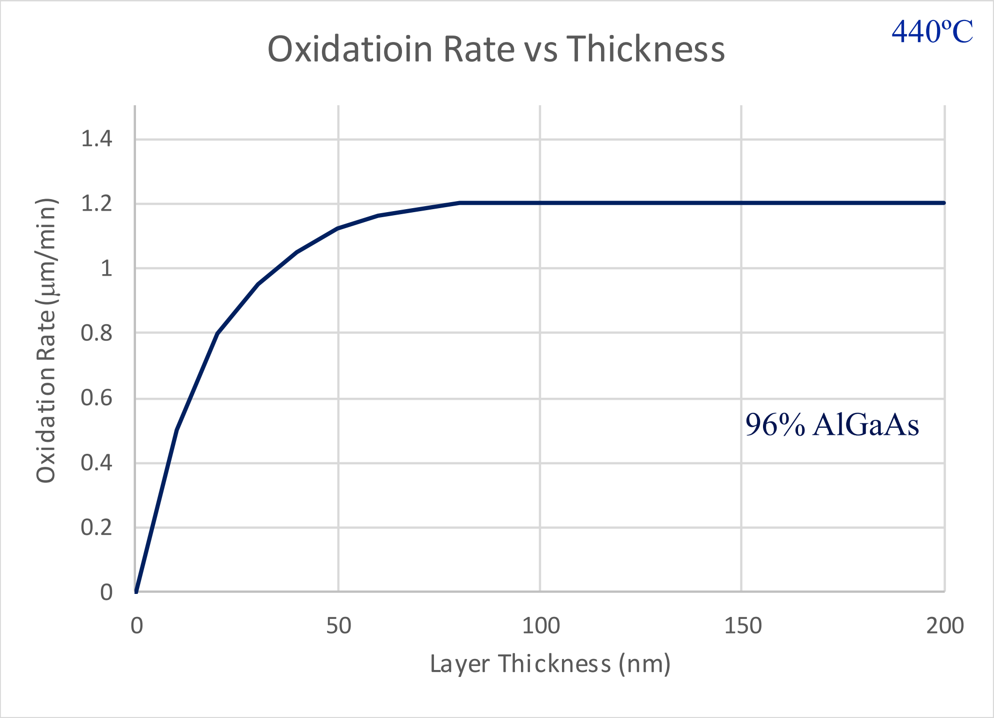
Oxidation Rate

Temperature



Oxidation Rate

Layer Thickness



Layers thicker than ~75nm oxidize at the same rate.

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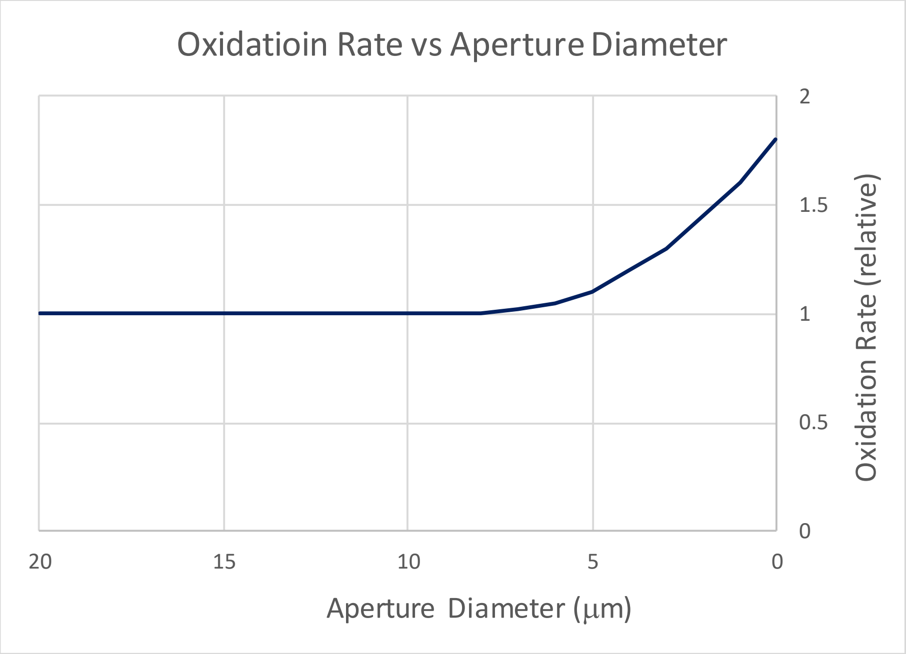
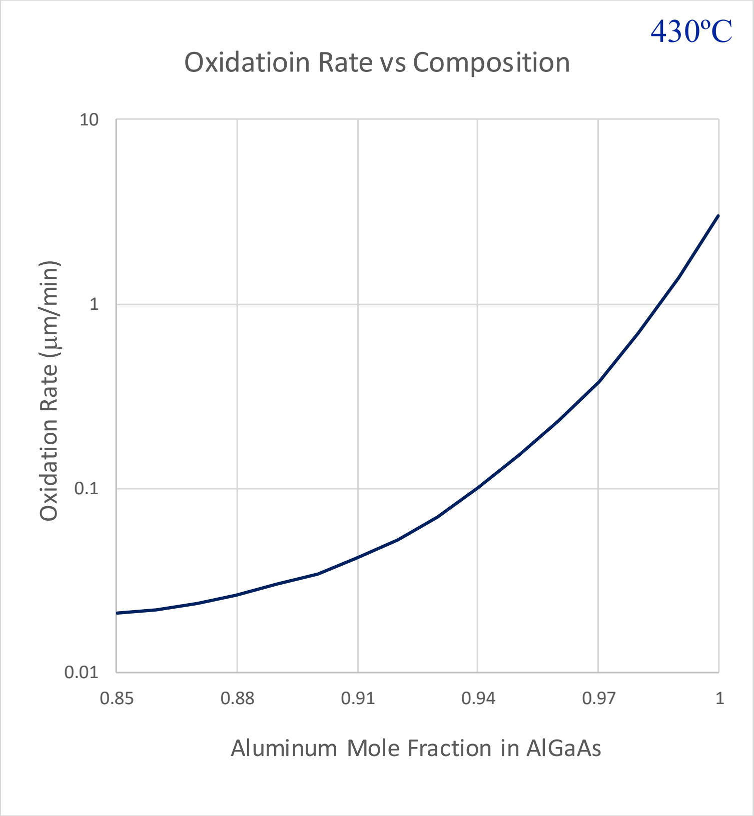
Cylindrical Geometry

Oxidation Rate Increases as the Aperture Shrinks



Oxidation Rate

AlGaAs Composition

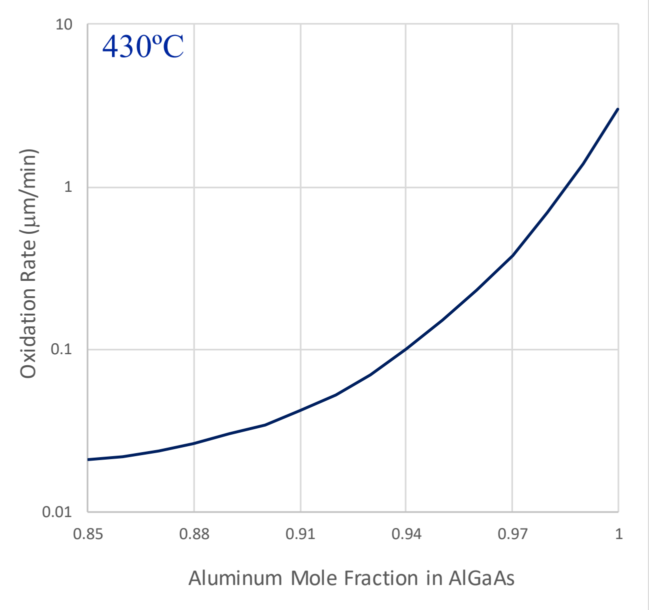


Only wafers from the same epitaxial growth run can be batch oxidized together.

Rate Sensitivity to Al Mole Fraction

0.2% aluminum mole fraction nonuniformity is considered normal.

D = 25µm, A = 8µm, Δx = 0.002			
Fraction	Rate	Slope	Nonuniformity (µm)
97	0.3	0.14	1.6
98	0.5	0.45	3.1
99	1.2	1.25	3.5
100	3	NA	0



Oxidation rate and uniformity are highly sensitive to aluminum mole fraction.

Substitution of AlAs for AlGaAs

Advantage:

- Eliminates compositional nonuniformities over the wafer and from run to run.

Disadvantage:

- Oxidized layer shrinkage is nearly double with AlAs relative to $Al_{.97}Ga_{.03}As$. This results in significantly higher stress in oxidized AlAs layers.