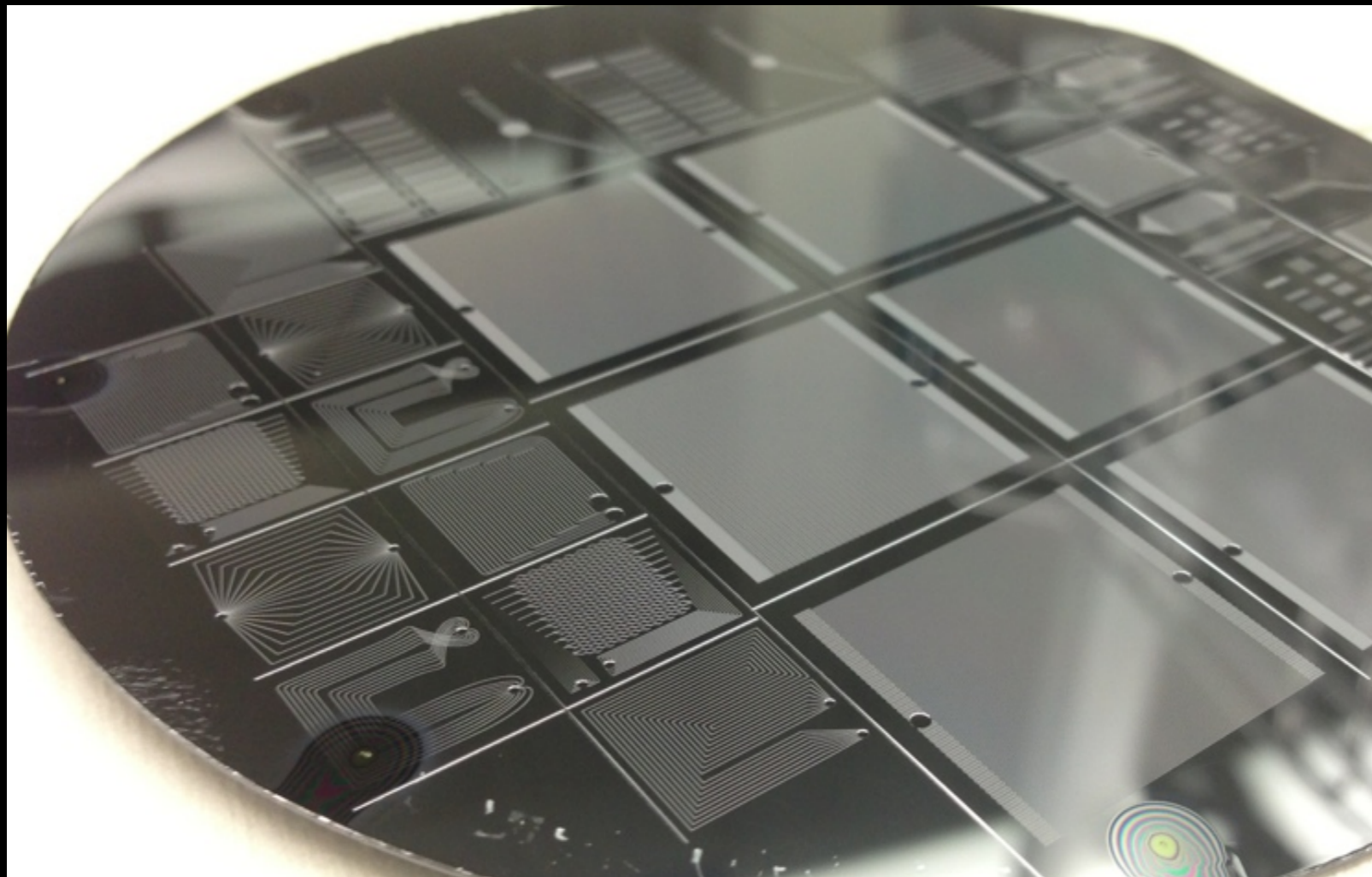


microCHANNELS



Collin Bampton
Chris Kenney

HIGH-ENERGY PARTICLE PHYSICS

HIGH-ENERGY
PARTICLE PHYSICS
DETECTORS

COOLING

HIGH-ENERGY

PARTICLE PHYSICS

DETECTORS

INTEGRATED
microCHANNEL
COOLING

HIGH-ENERGY
PARTICLE PHYSICS
DETECTORS

INTEGRATED
microCHANNEL
COOLING
for
HIGH-ENERGY
PARTICLE PHYSICS
DETECTORS

Concept

Concept

Design

Concept

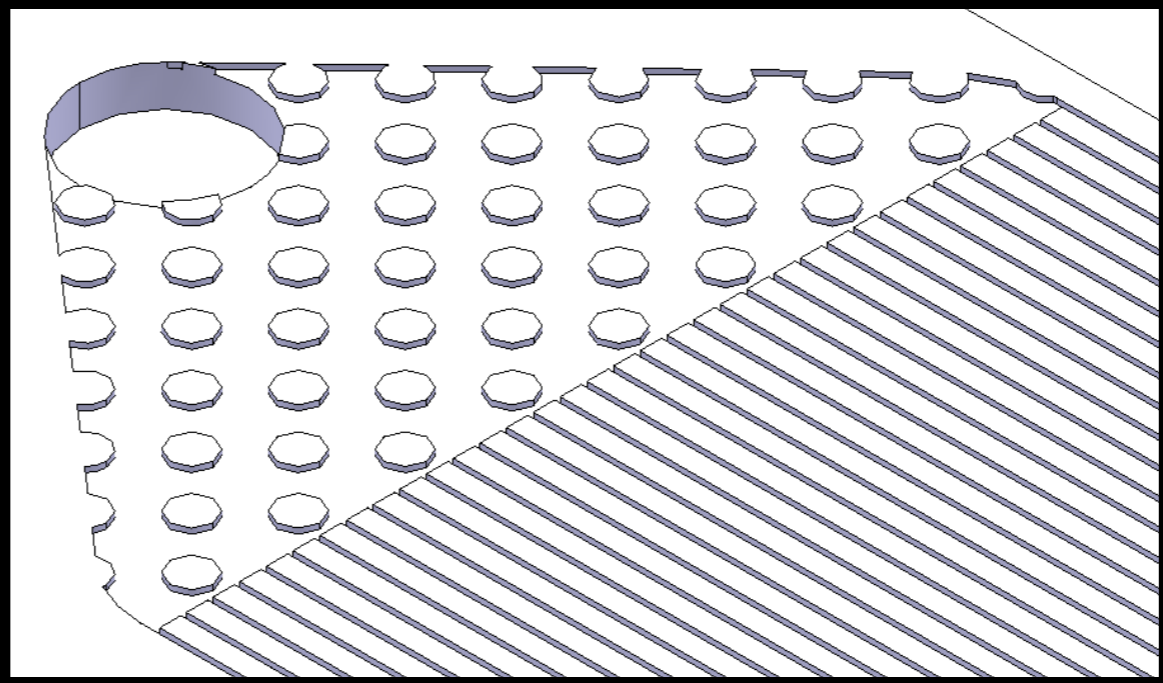
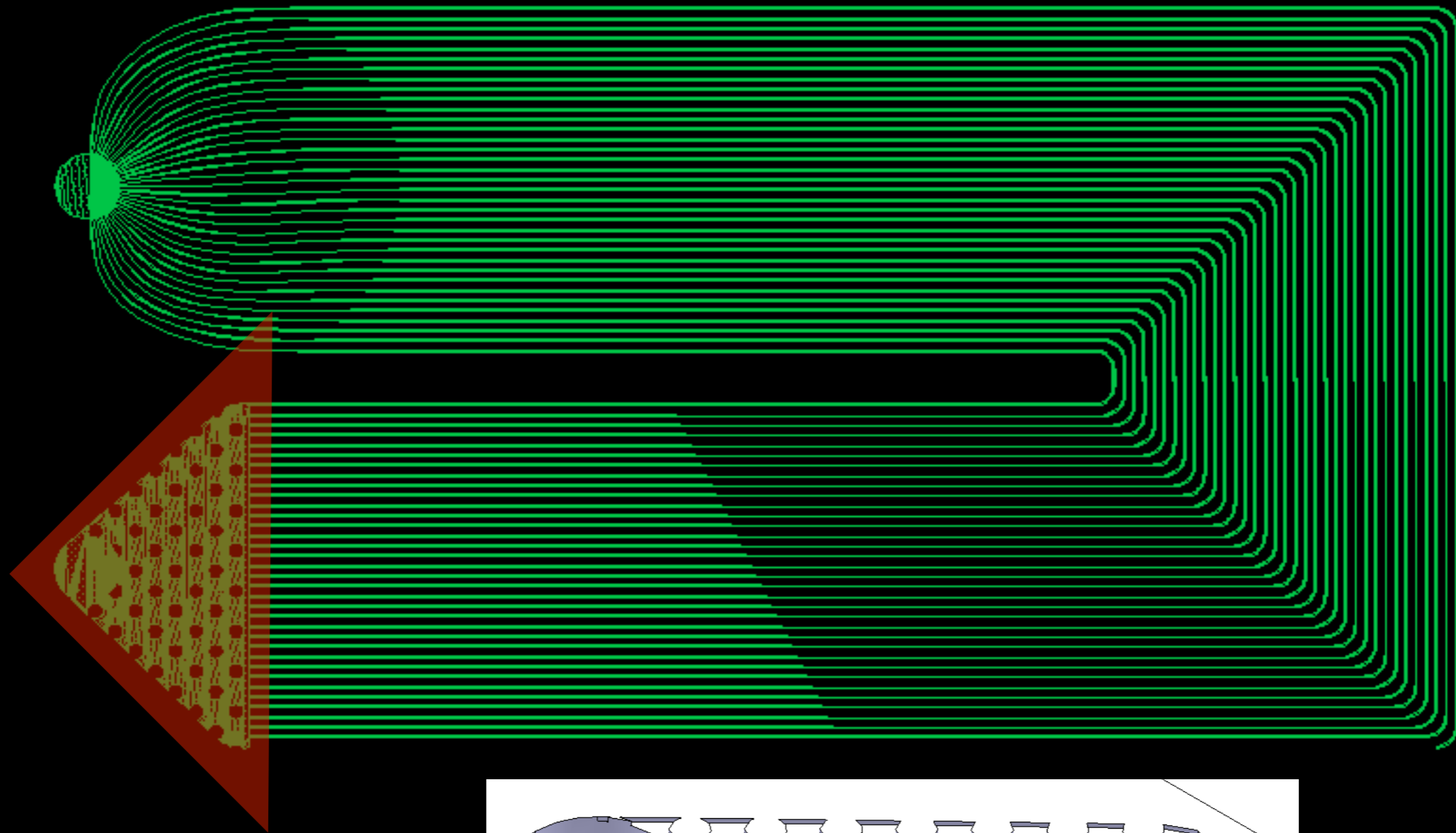
Design

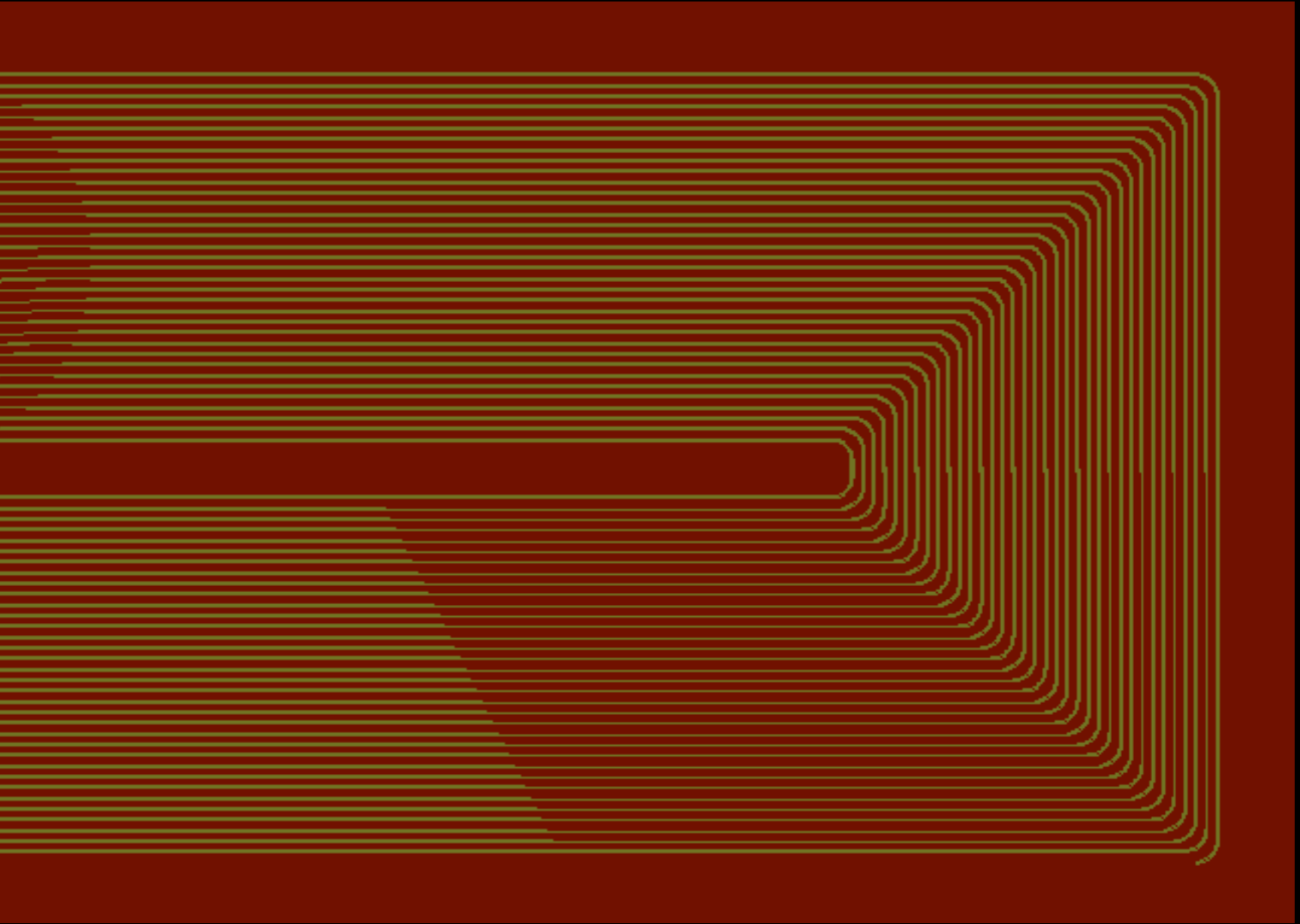
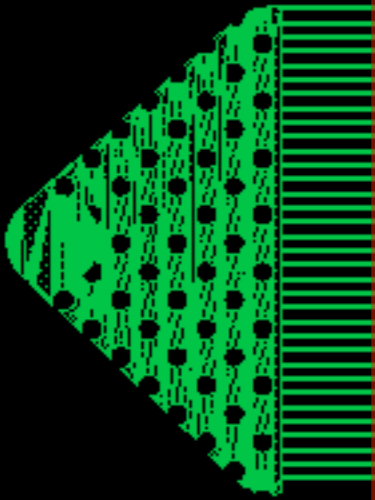
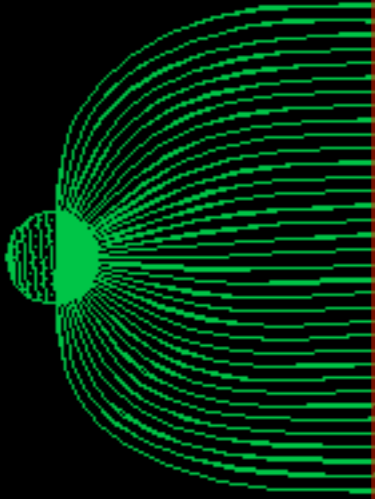
Fabrication

Concept









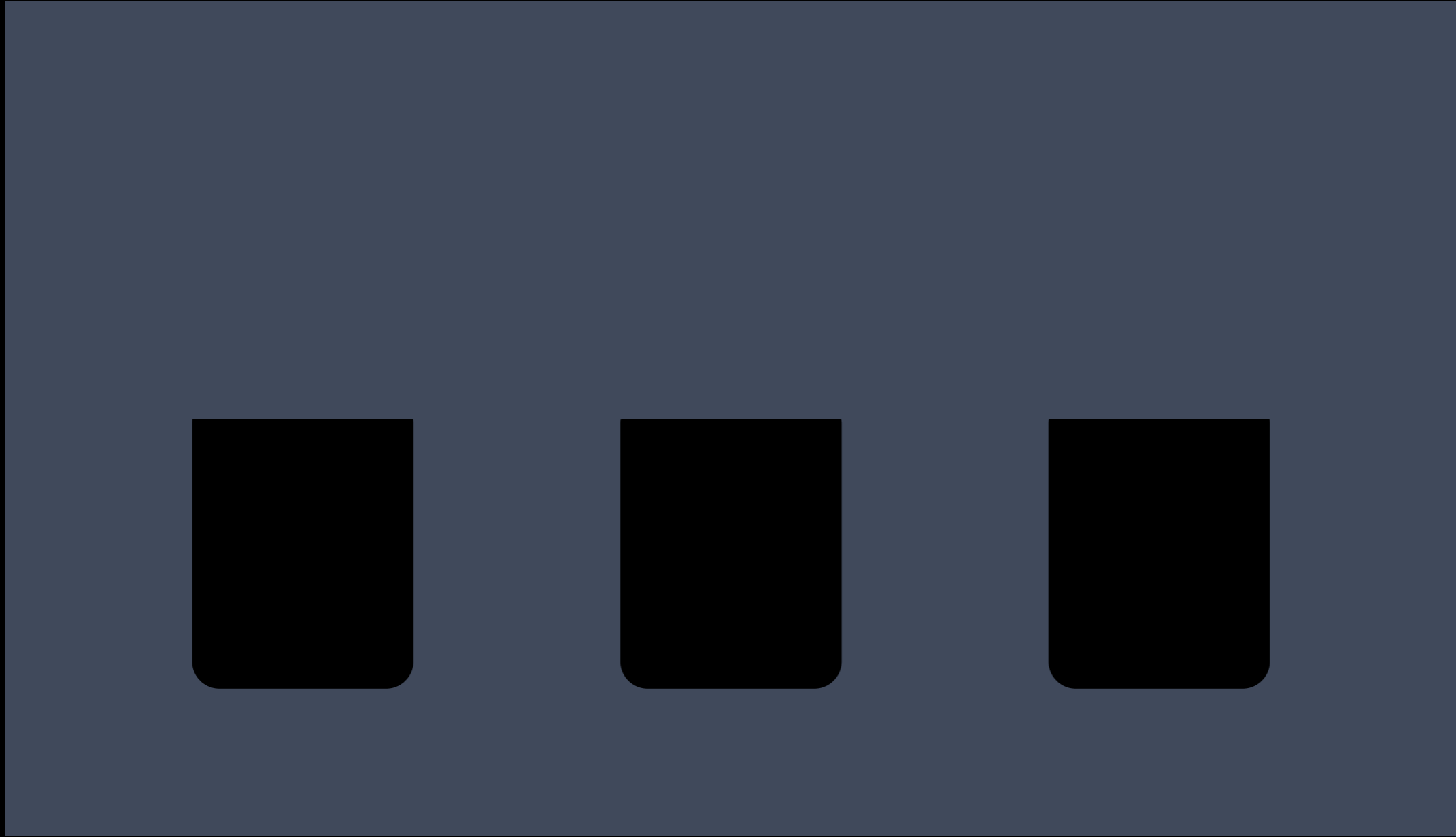




Profile



Profile



Profile



Top

Profile

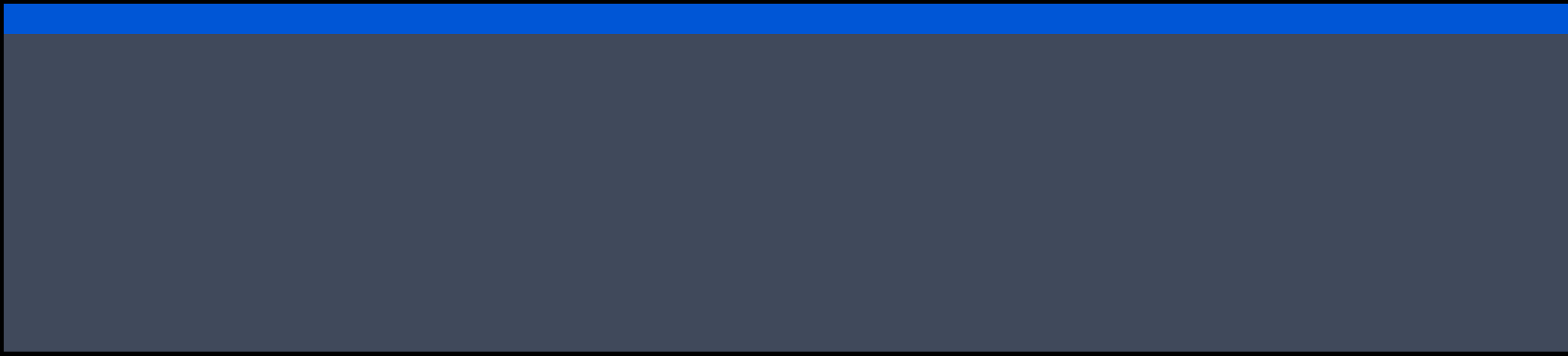


Silicon
500um



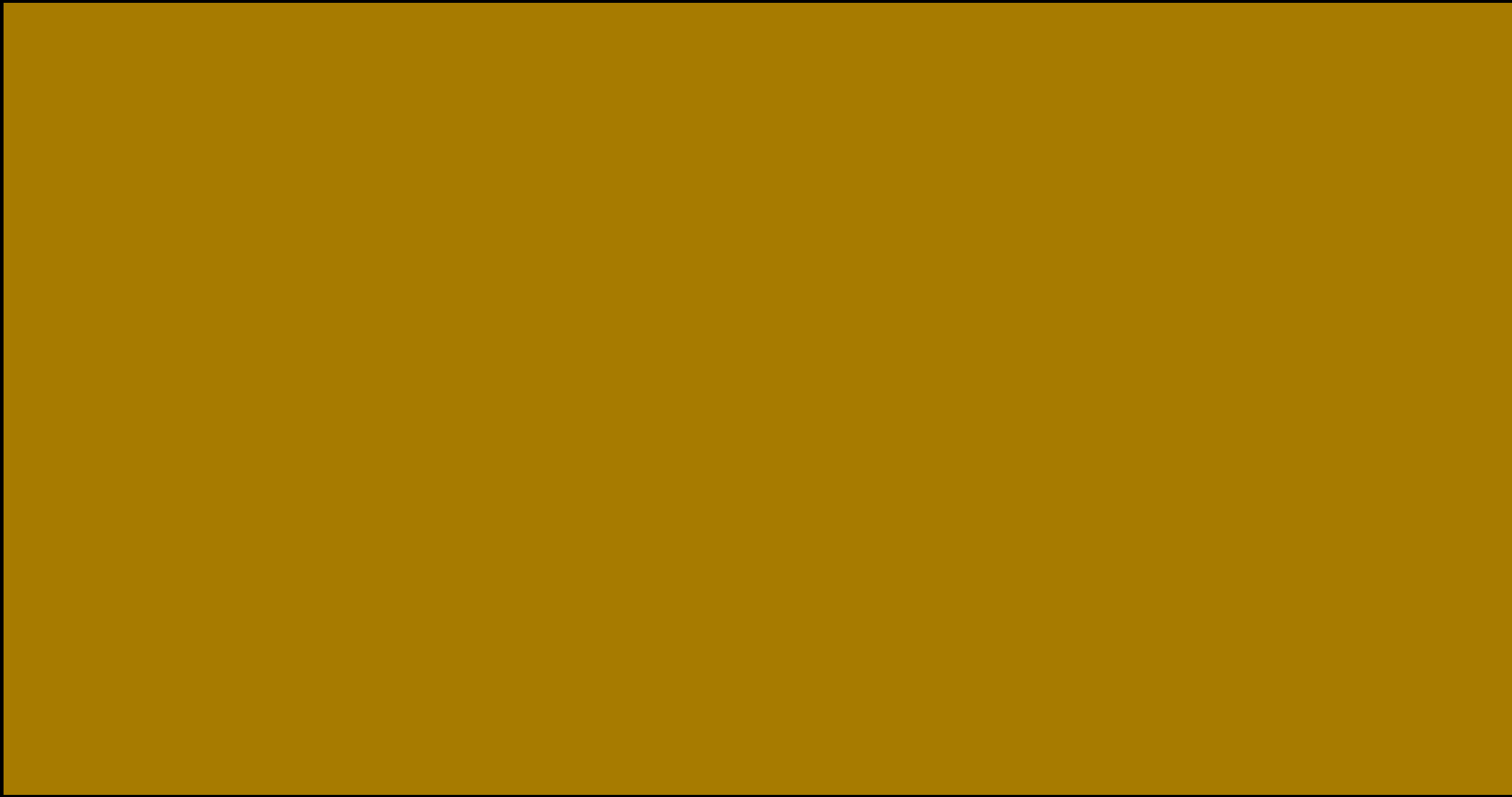
Top

Profile



Oxide
0.3um

Silicon
500um



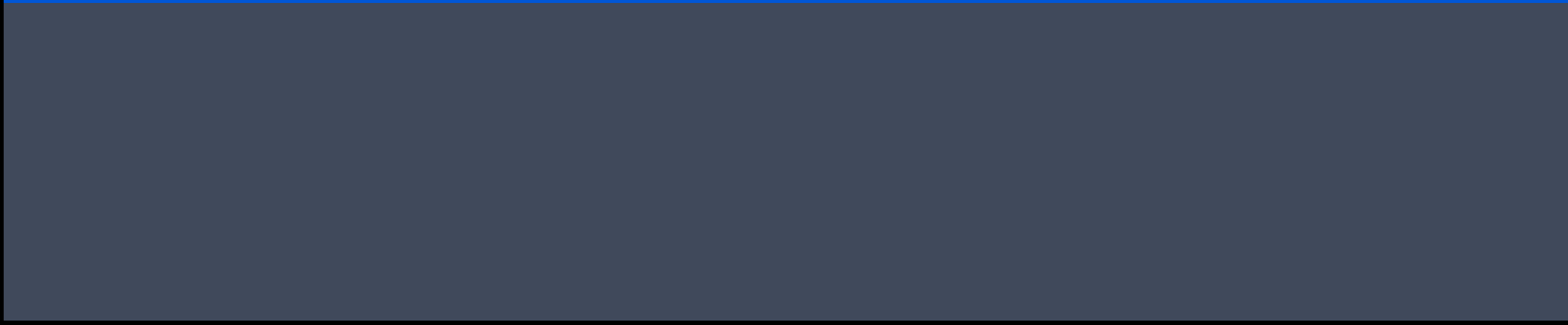
Nitride
0.5um

Top

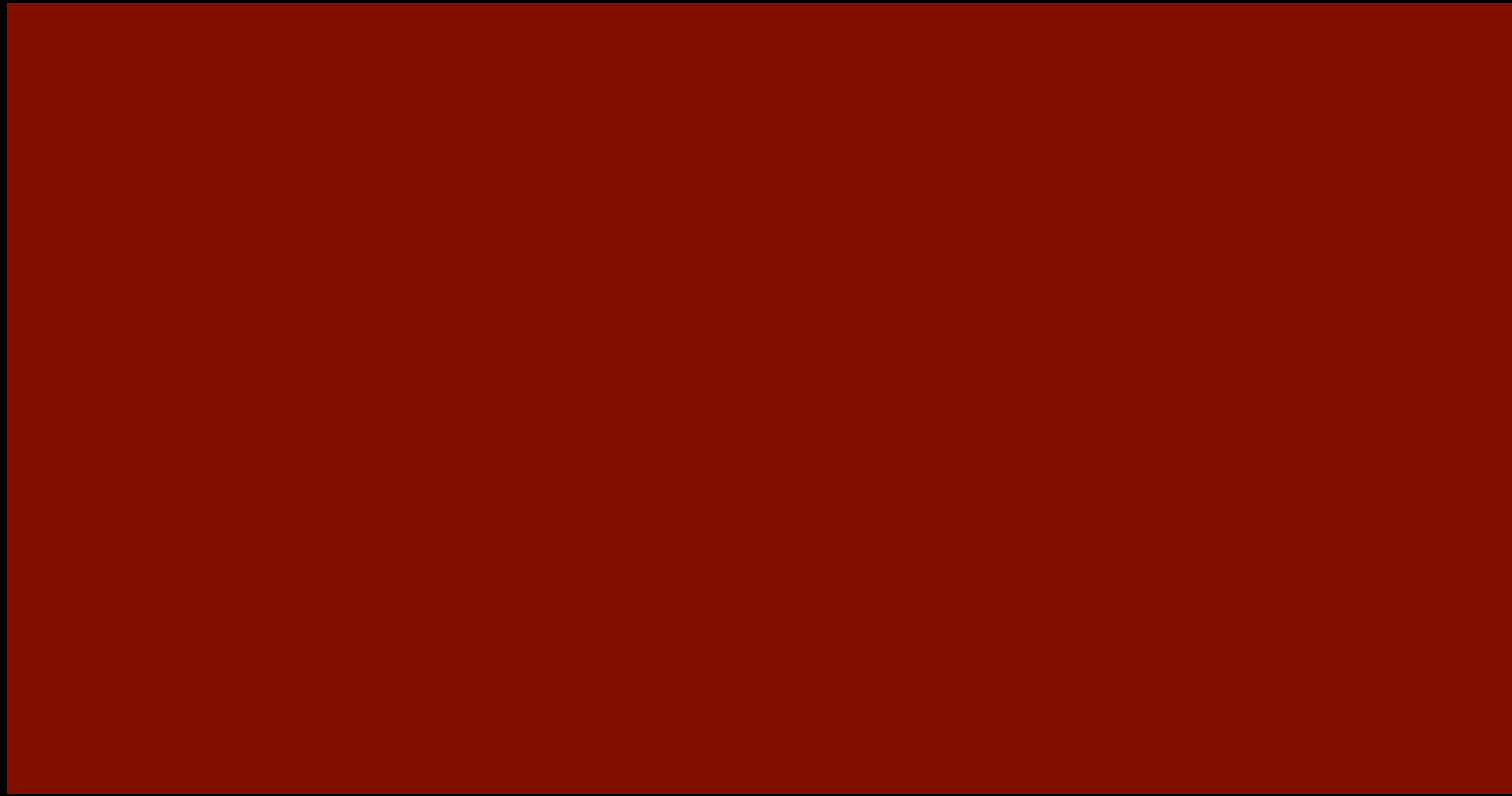
Profile



Oxide
0.3um

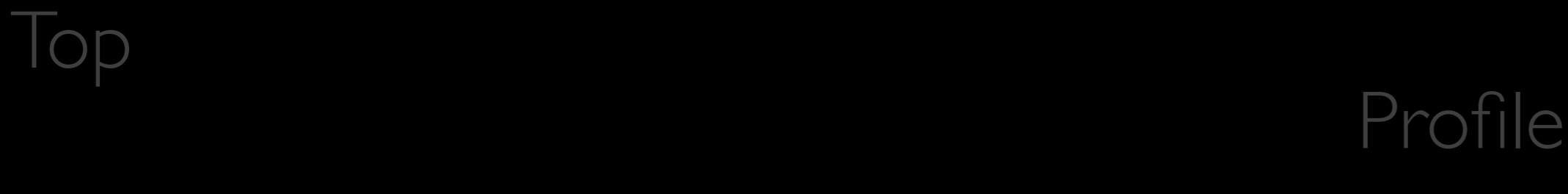


Silicon
500um



Resist
1.6um

Nitride
0.5um



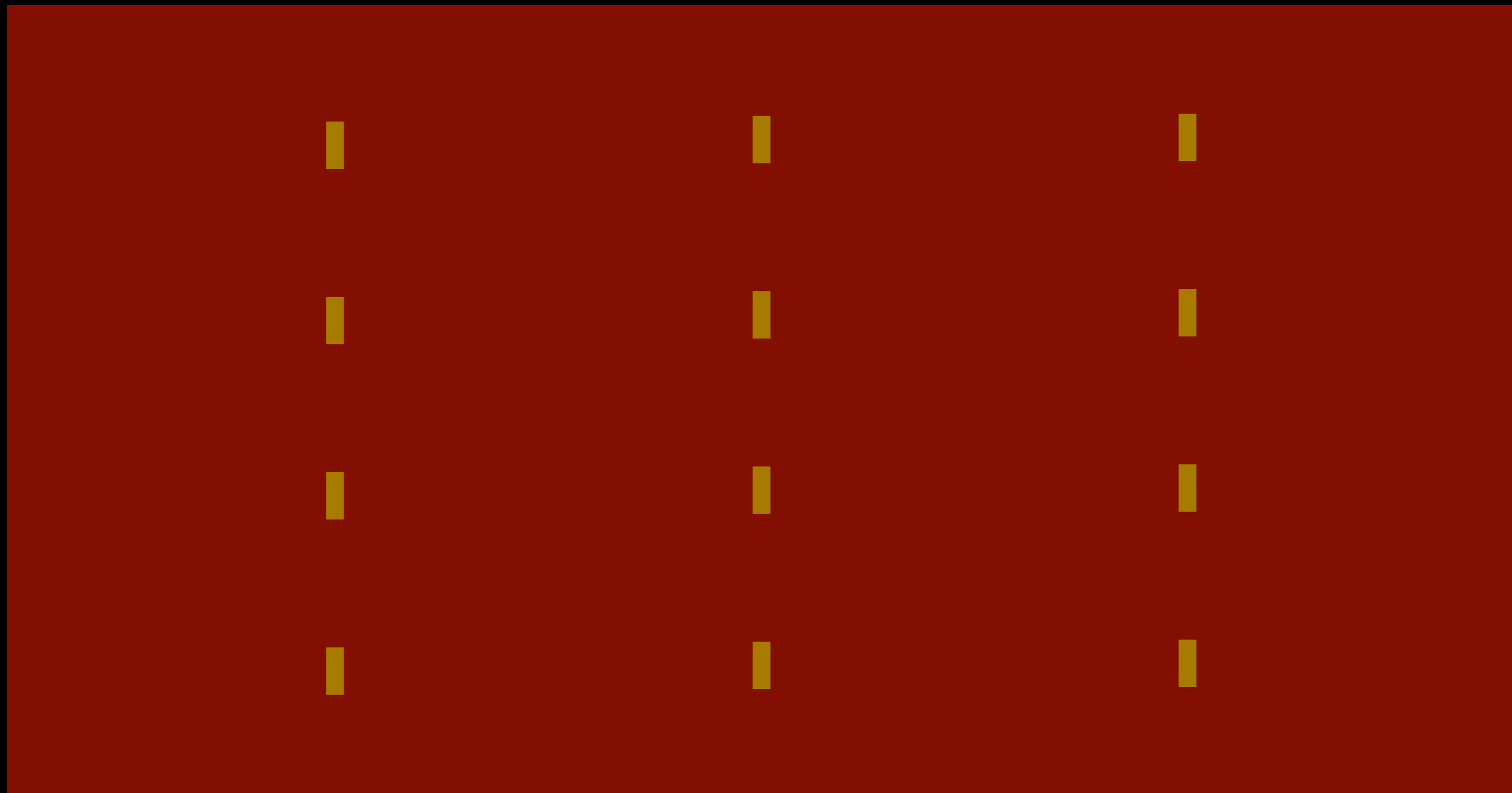
Oxide
0.3um



Silicon
500um

Top

Profile



Resist
1.6um

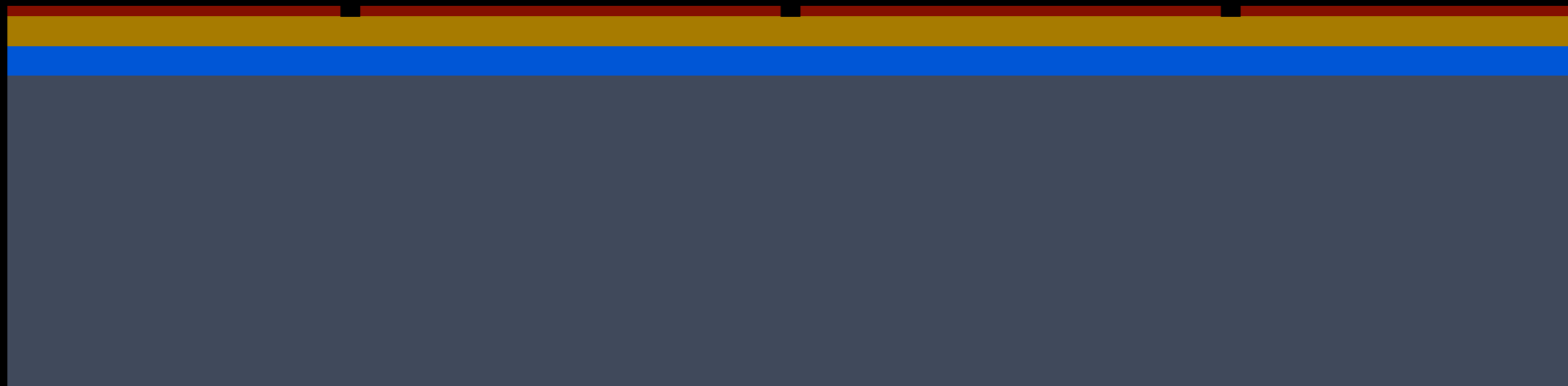
Nitride
0.5um

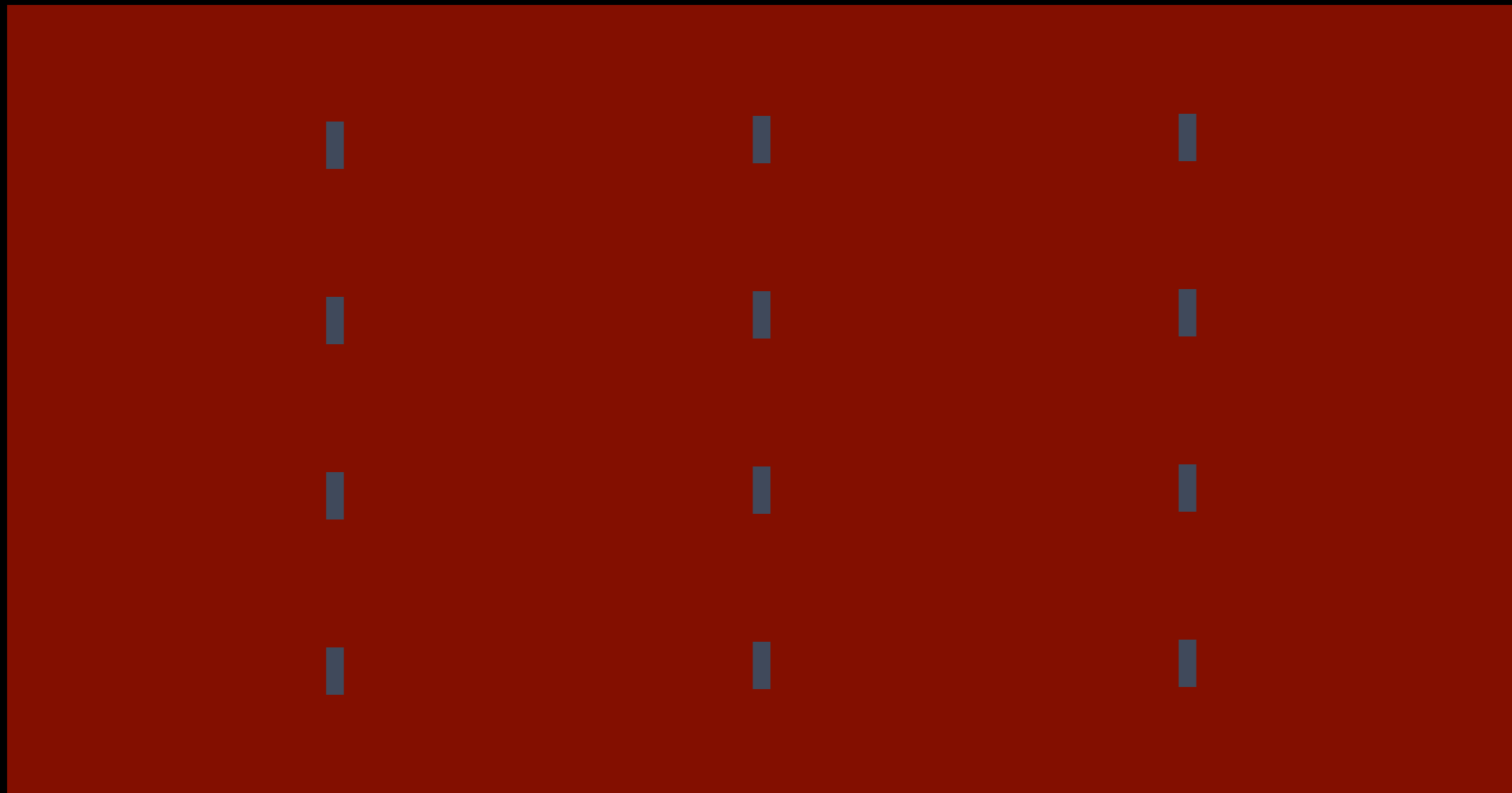
Top

Profile

Oxide
0.3um

Silicon
500um





Resist
1.6um

Nitride
0.5um

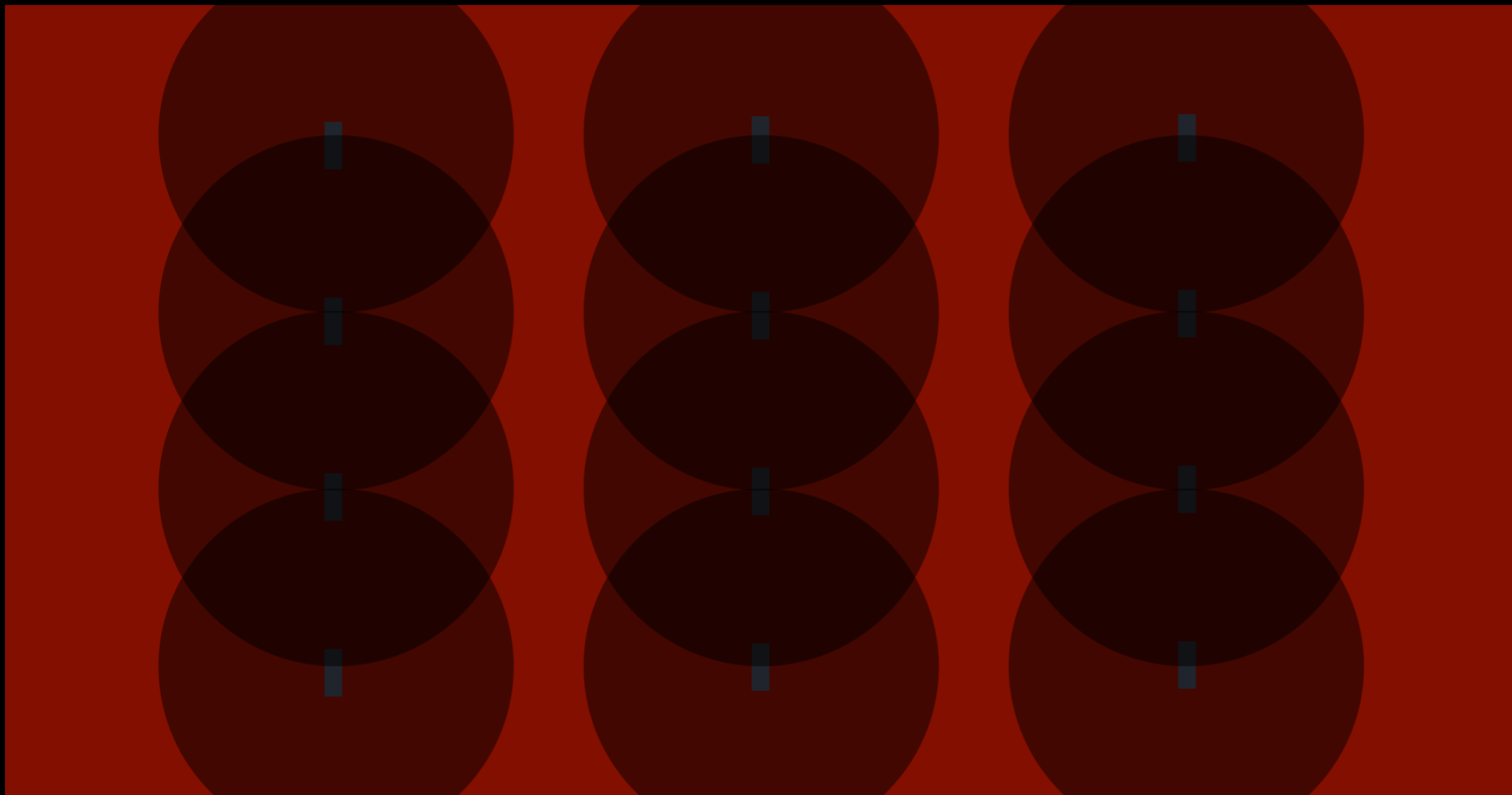
Top

Profile

Oxide
0.3um

Silicon
500um



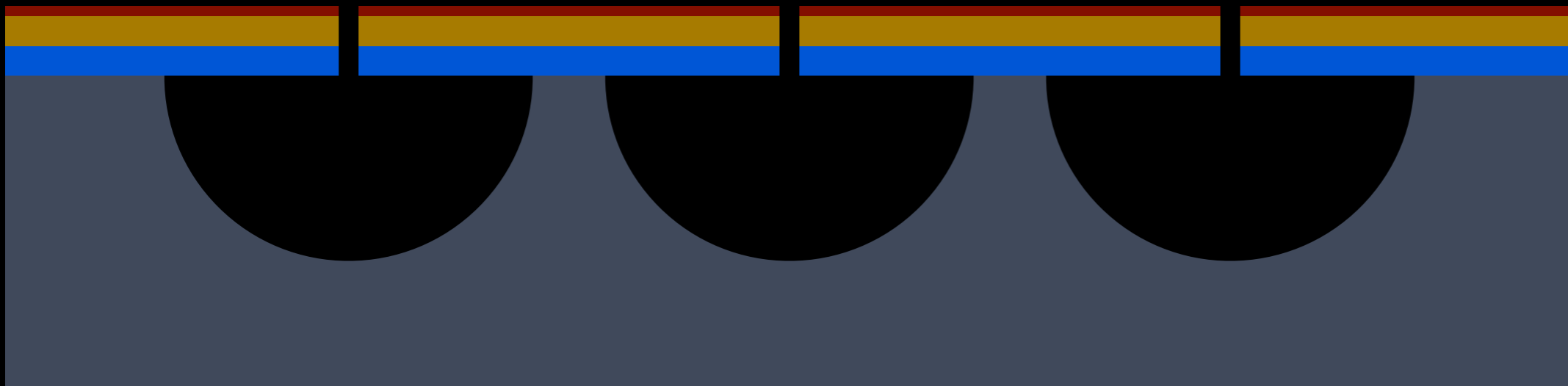


Resist
1.6um

Nitride
0.5um

Top

Profile



Oxide
0.3um

Silicon
500um



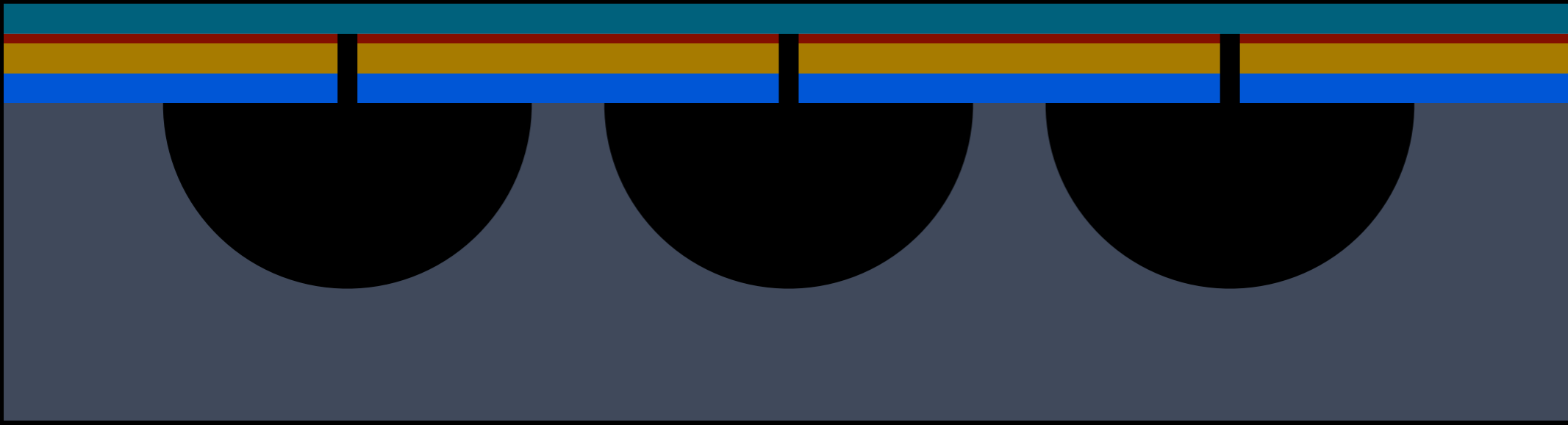
LTO
2um

Resist
1.6um

Nitride
0.5um

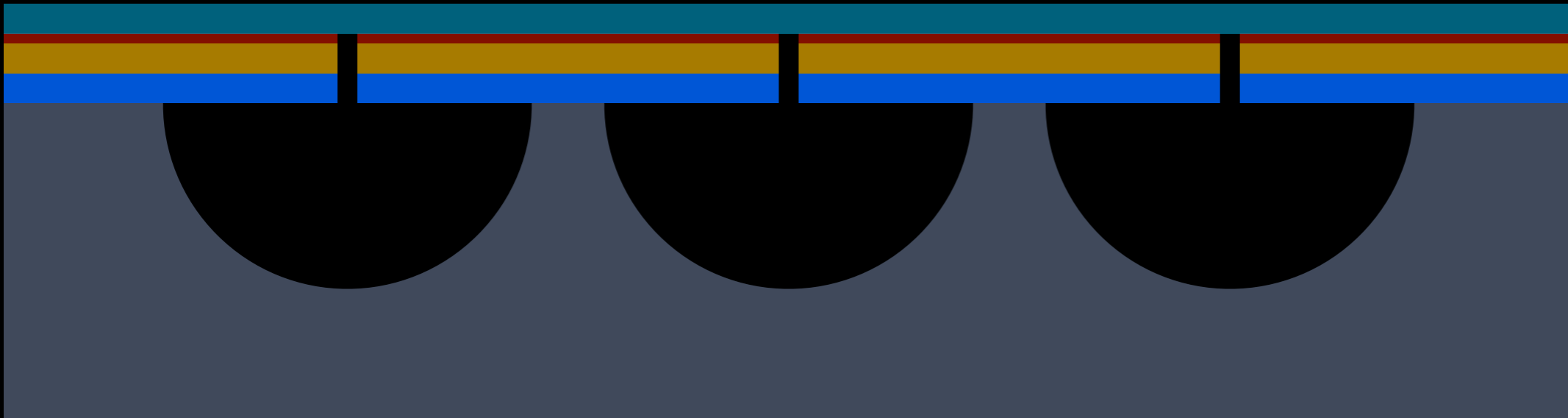
Top

Profile

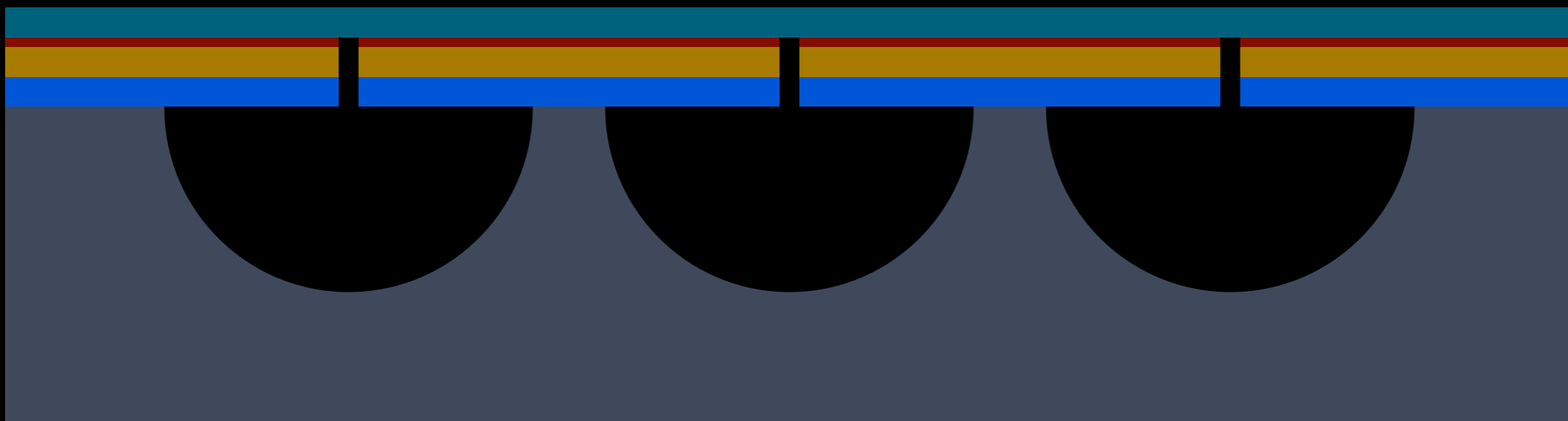


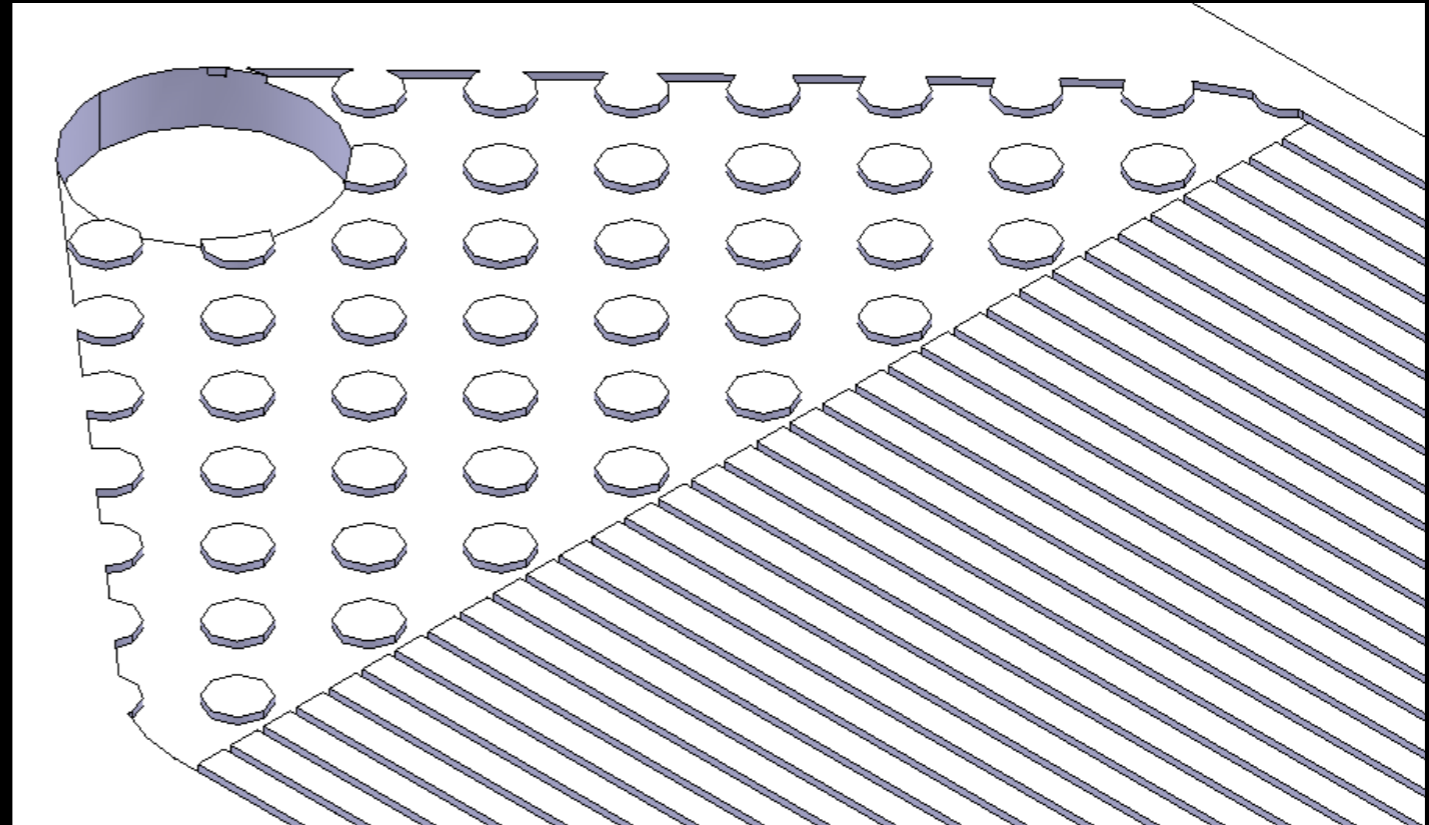
Oxide
0.3um

Silicon
500um

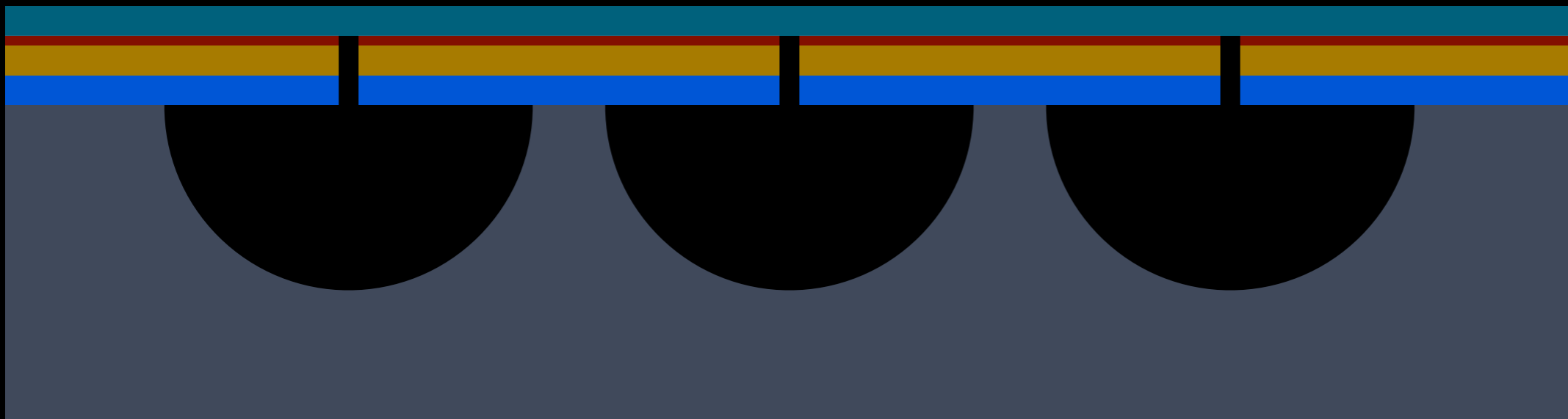


Limited maximum span





Limited maximum span

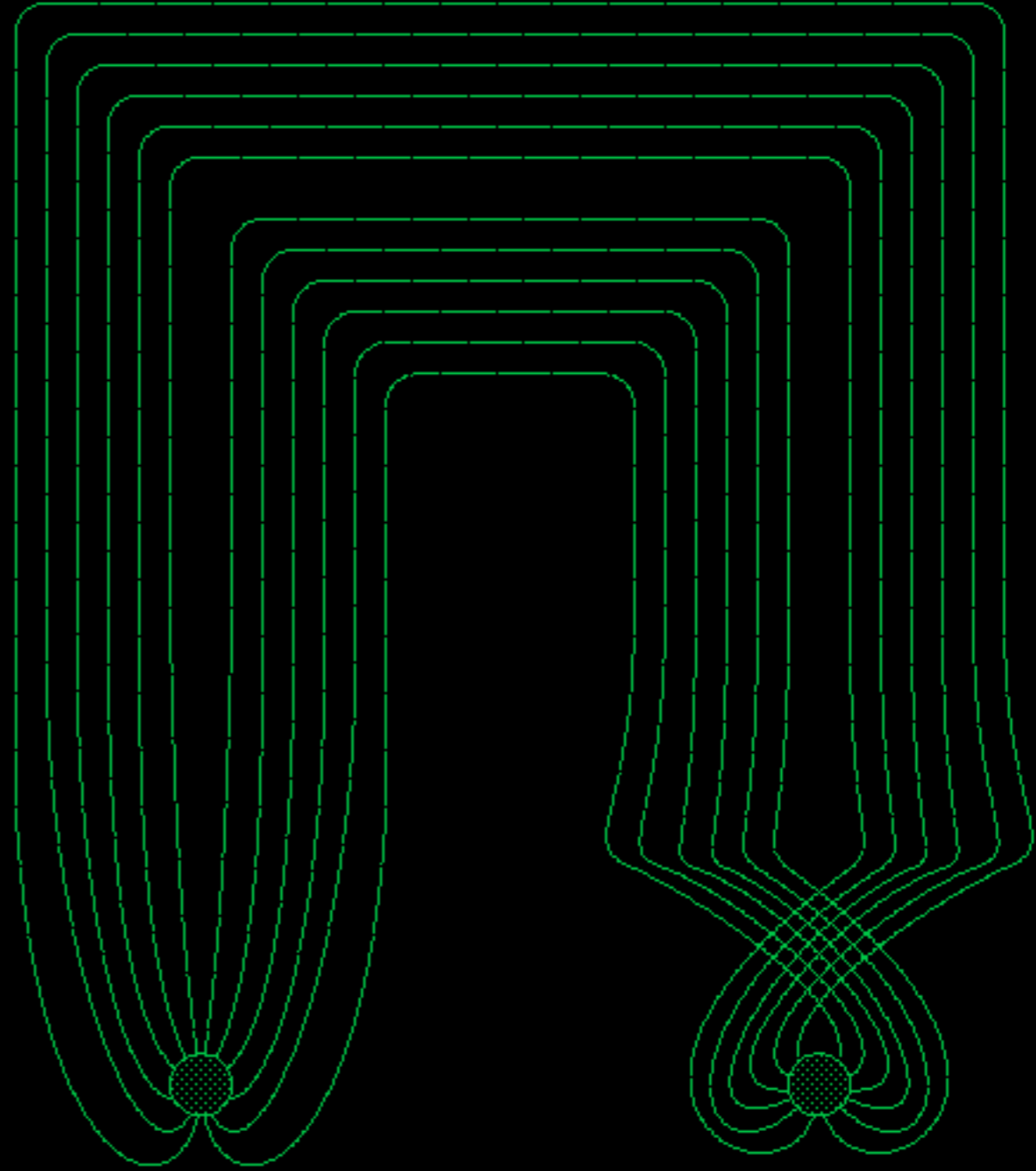


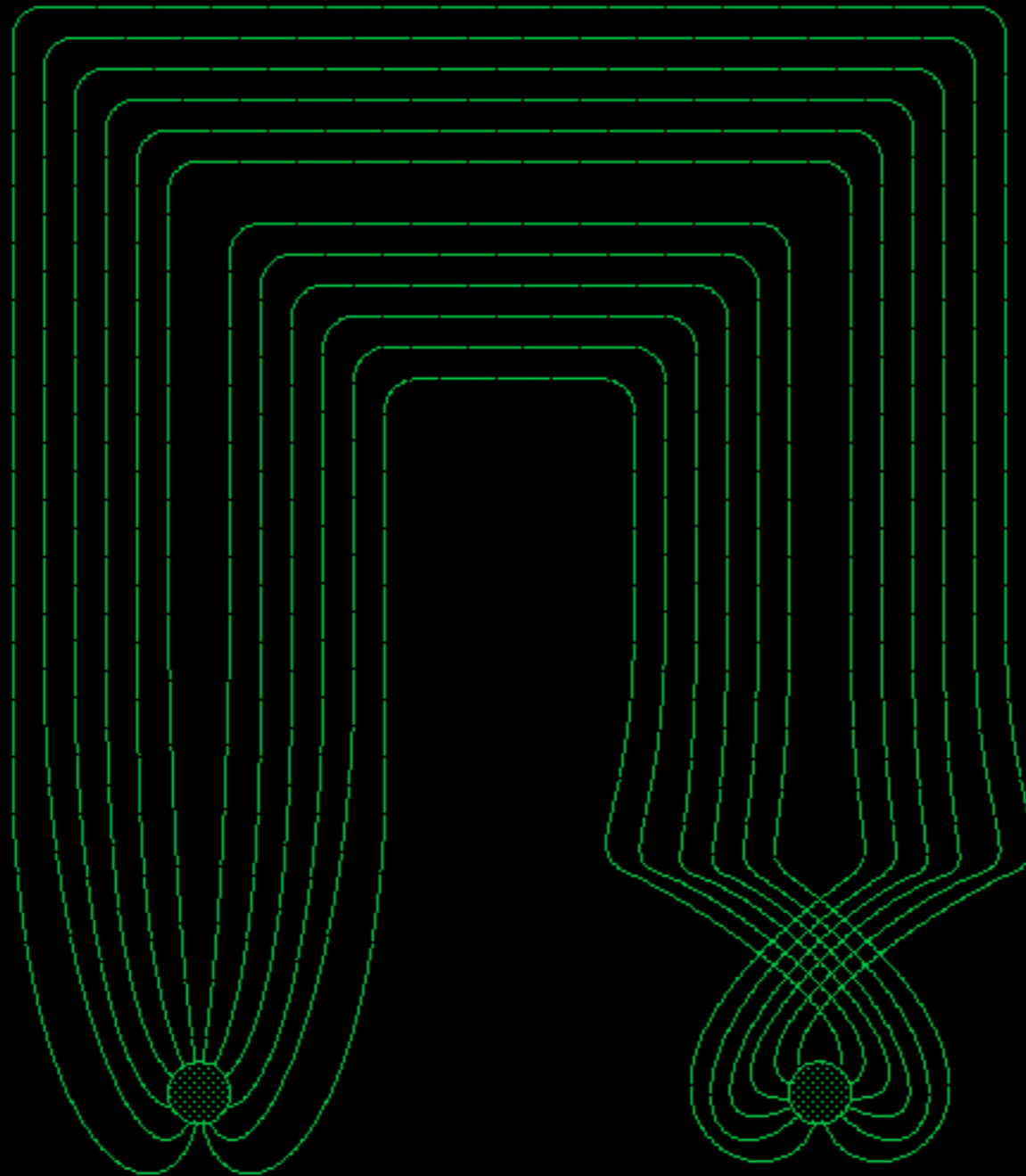
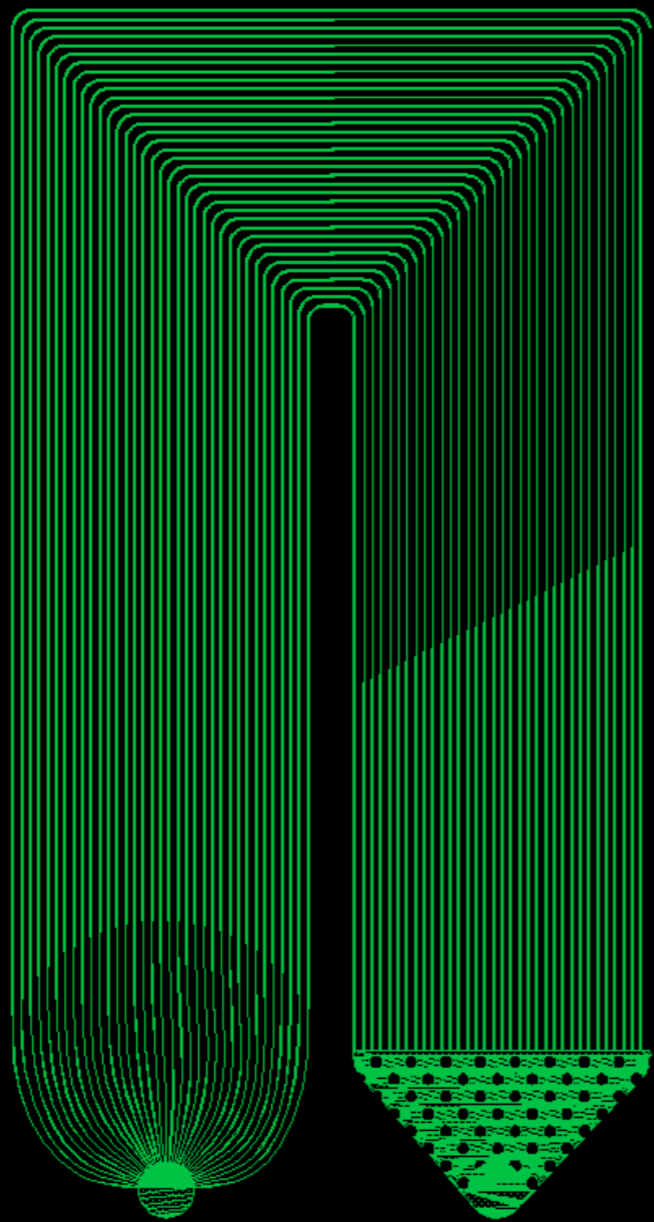
Concept

Design

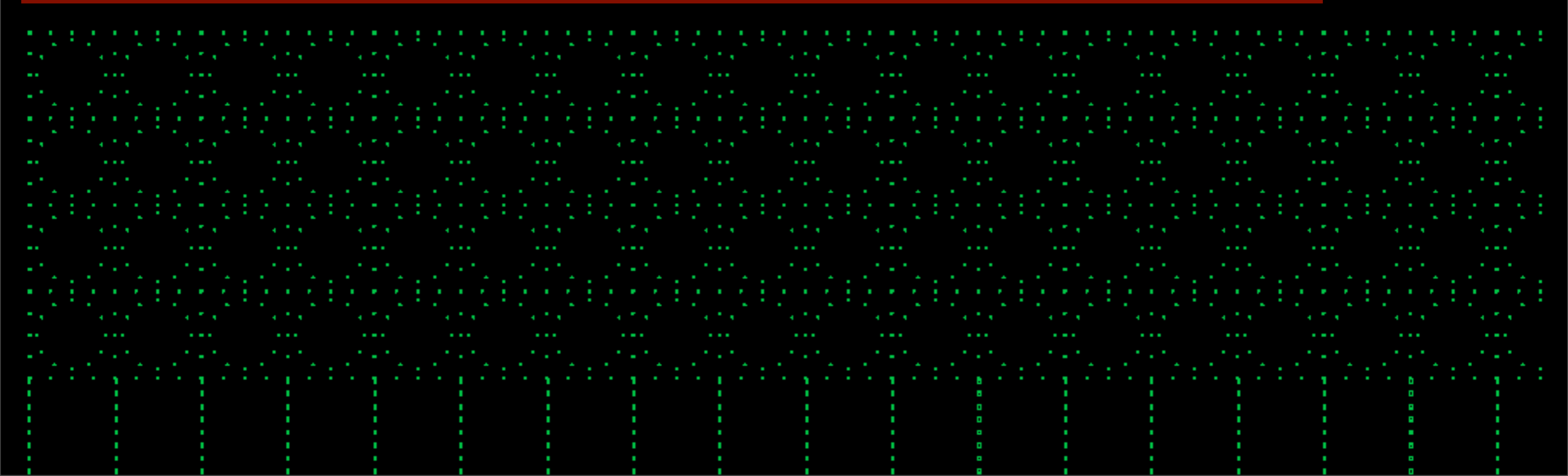
Fabrication

Design

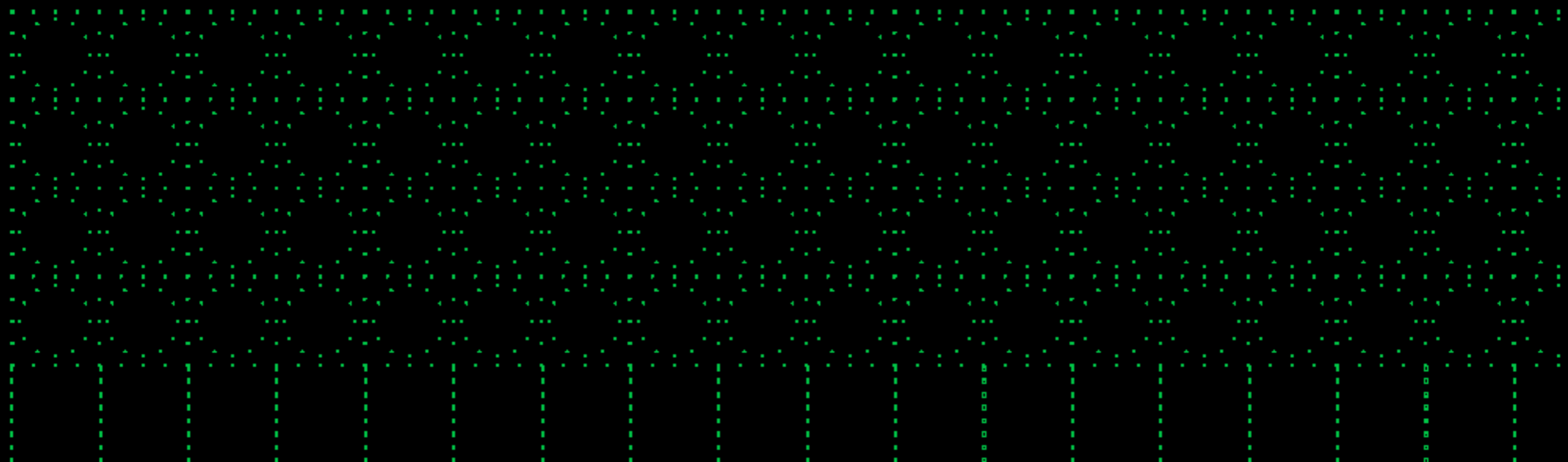
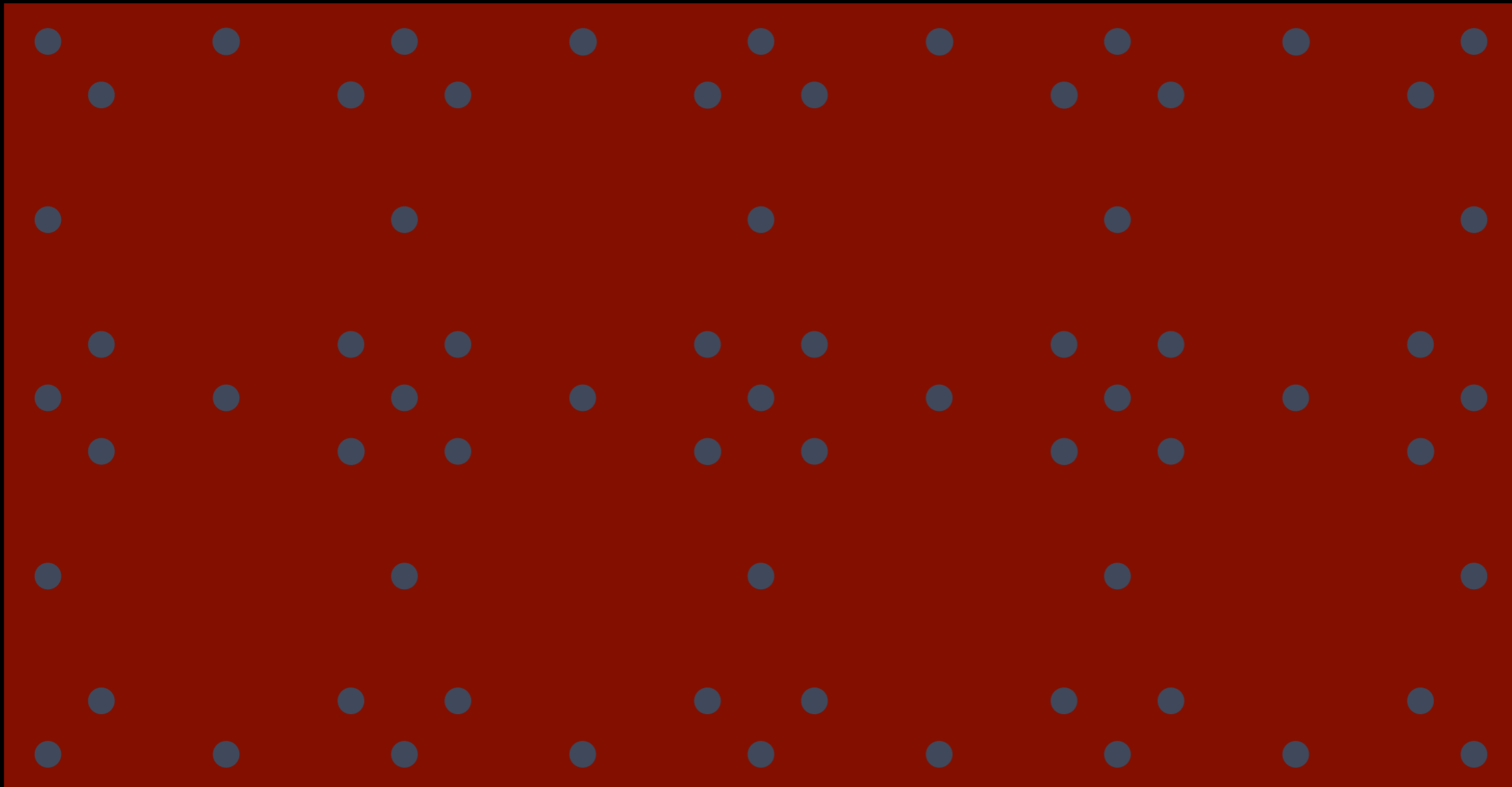




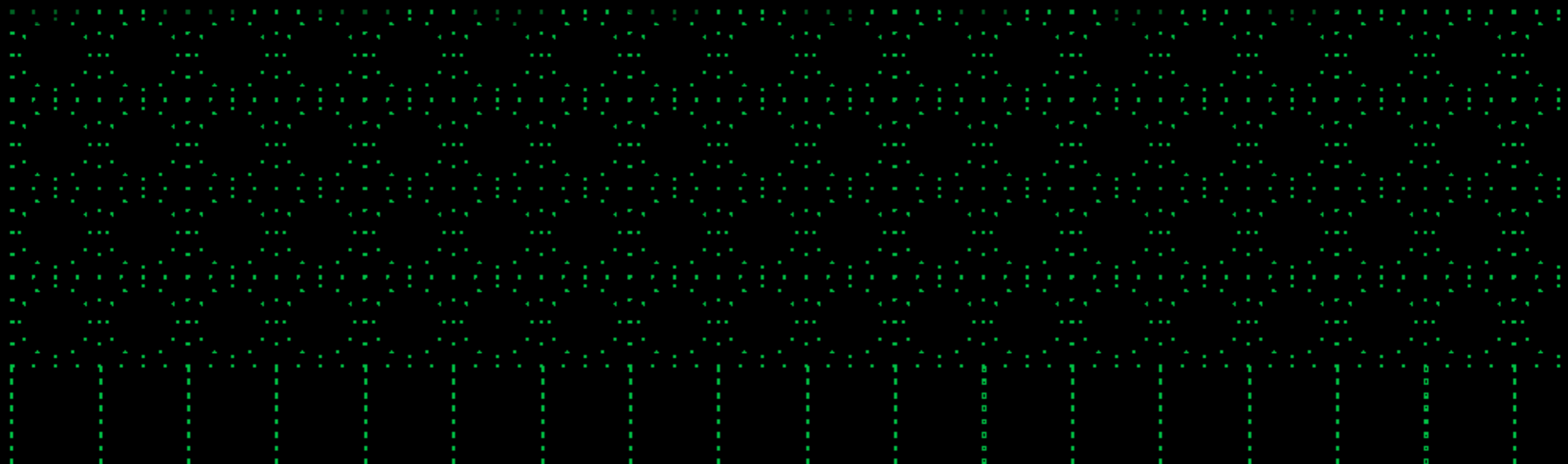
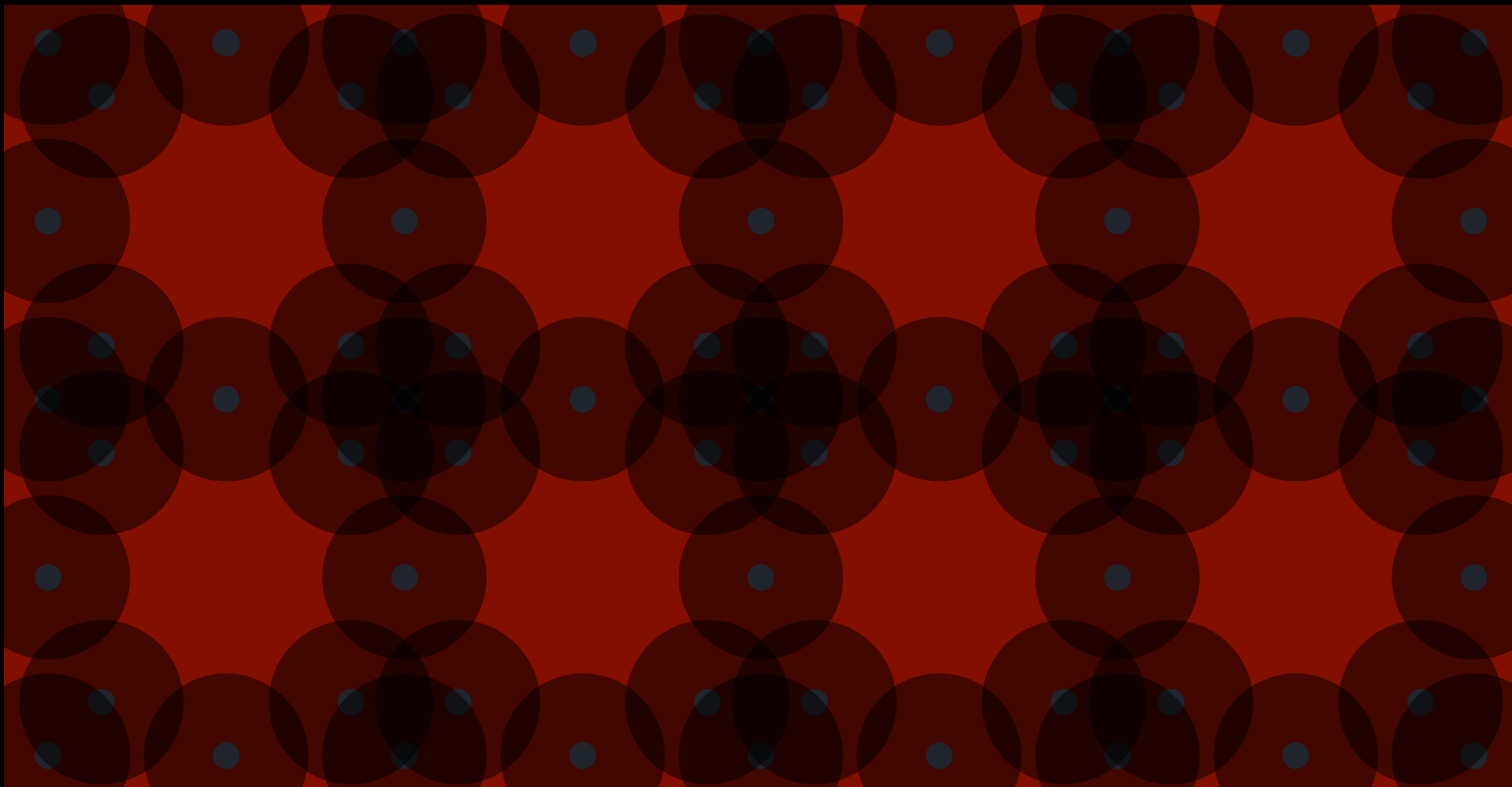
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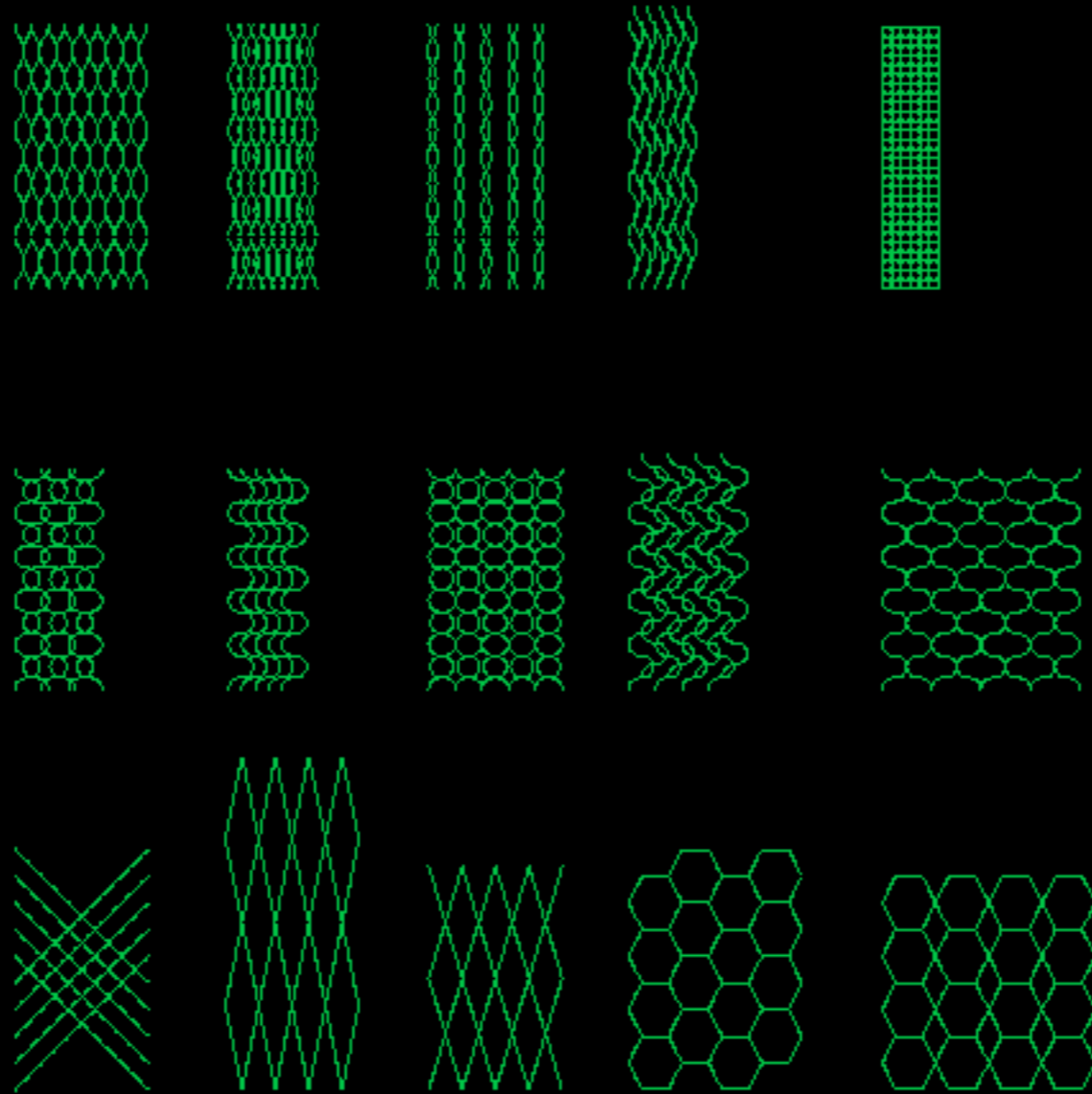


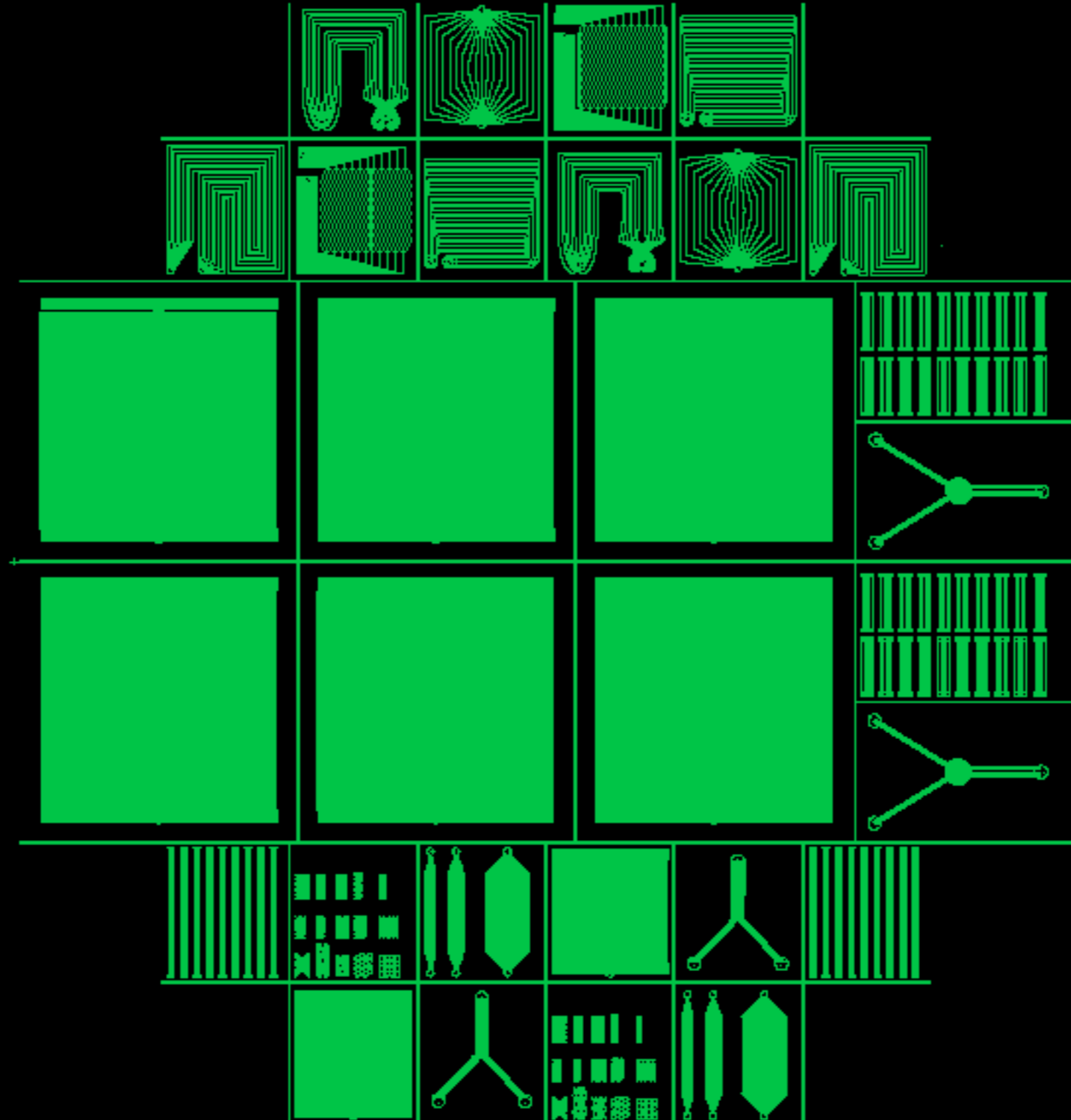
Top



Top





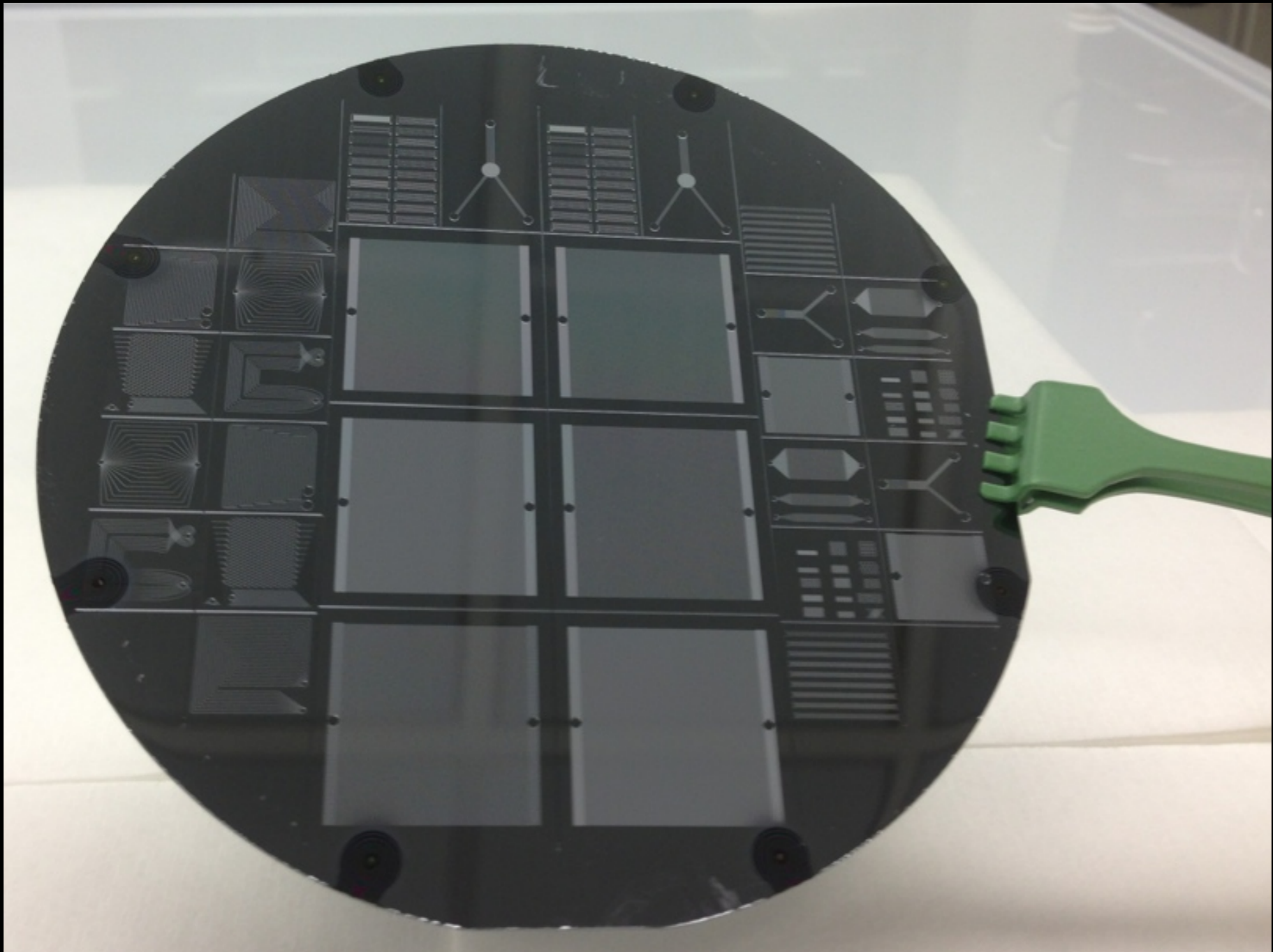


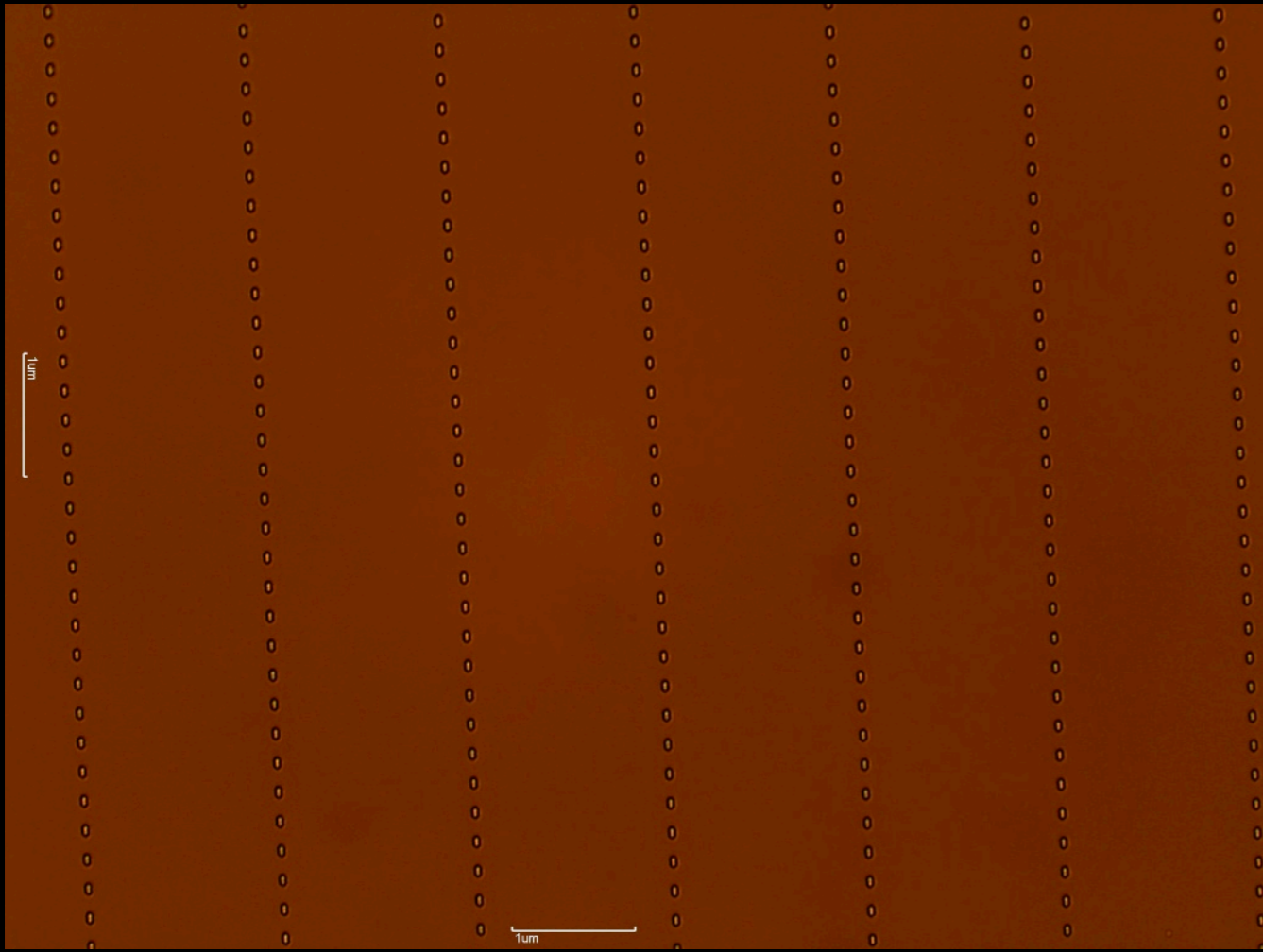
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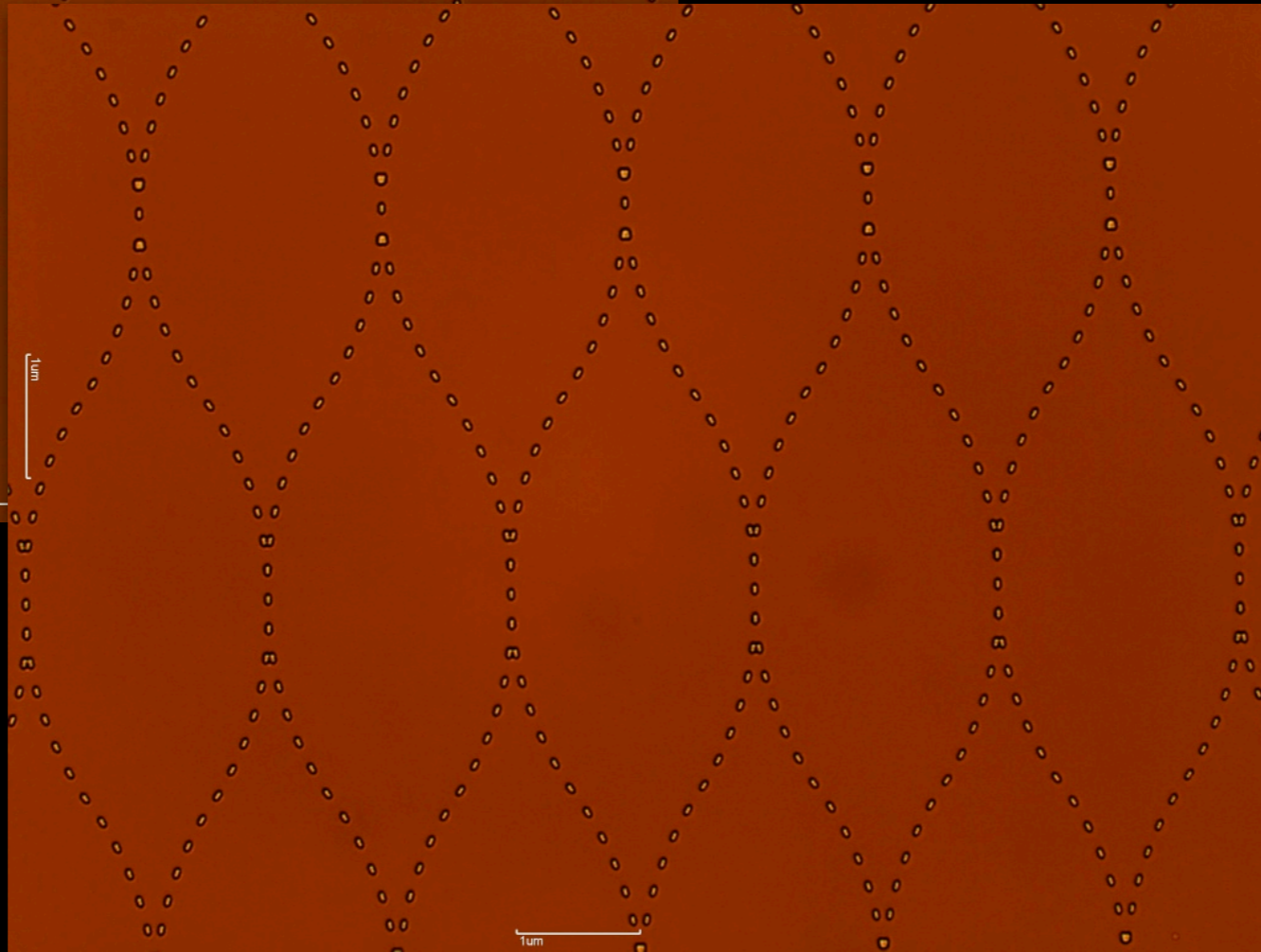
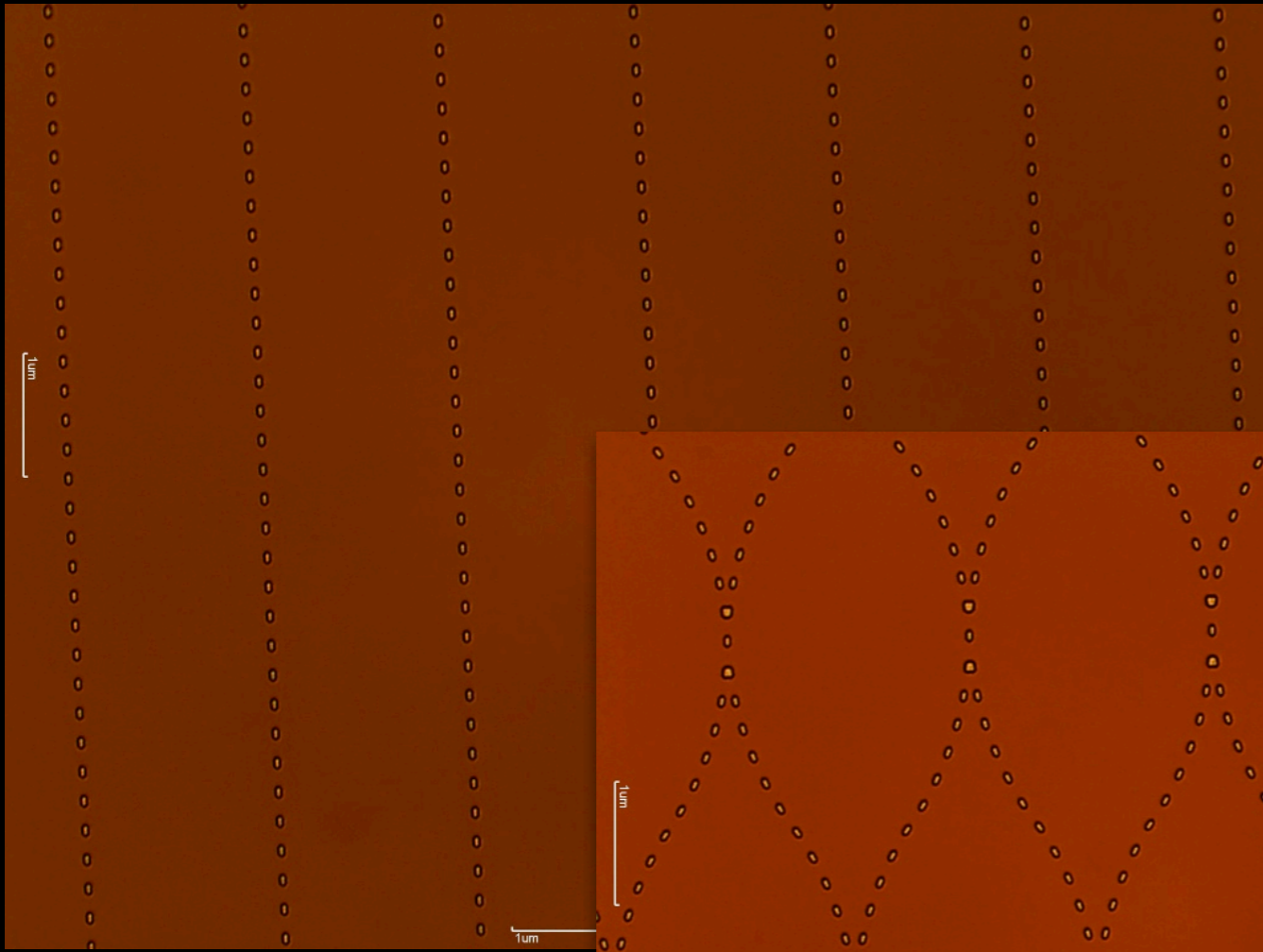
Design

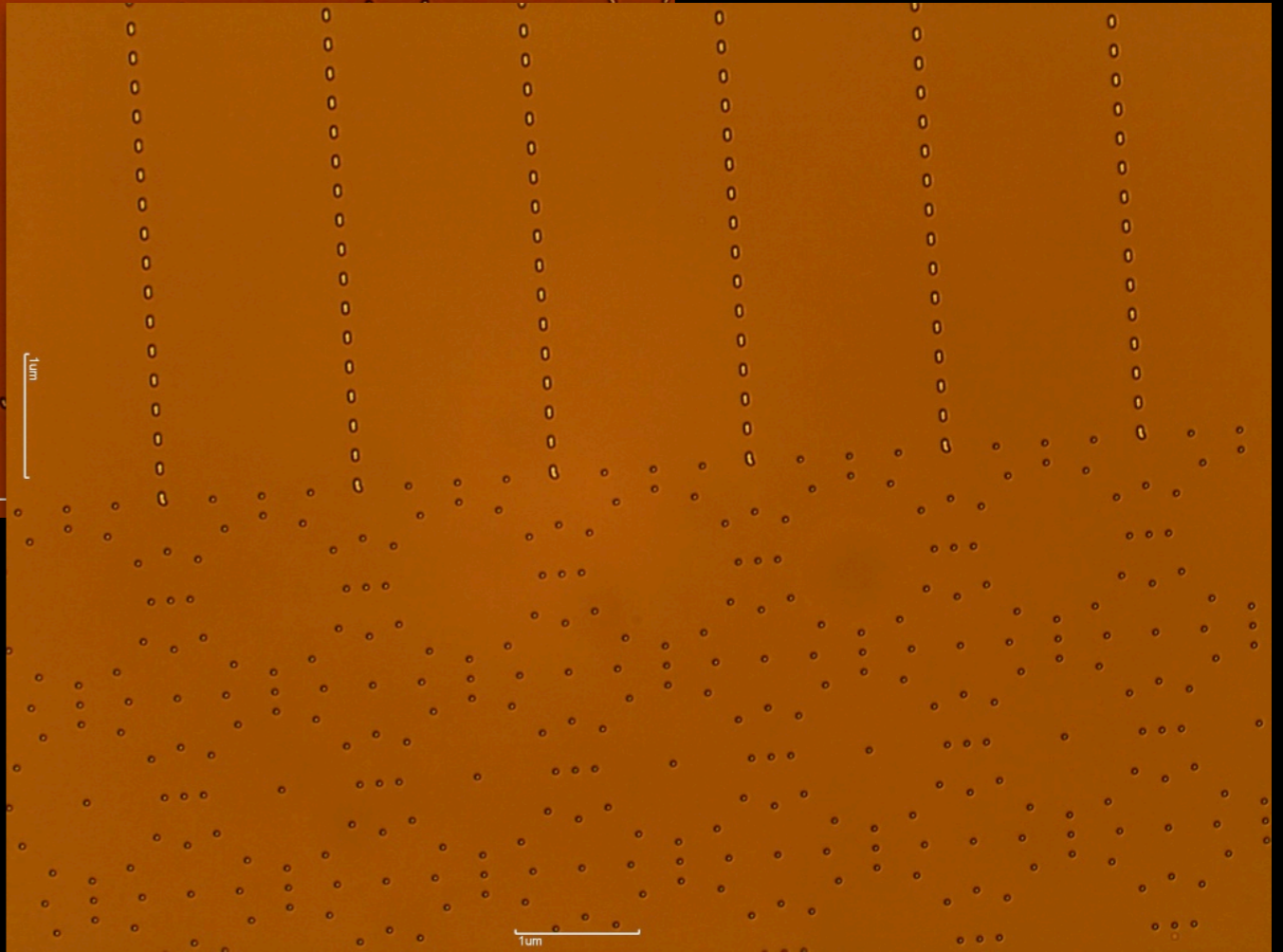
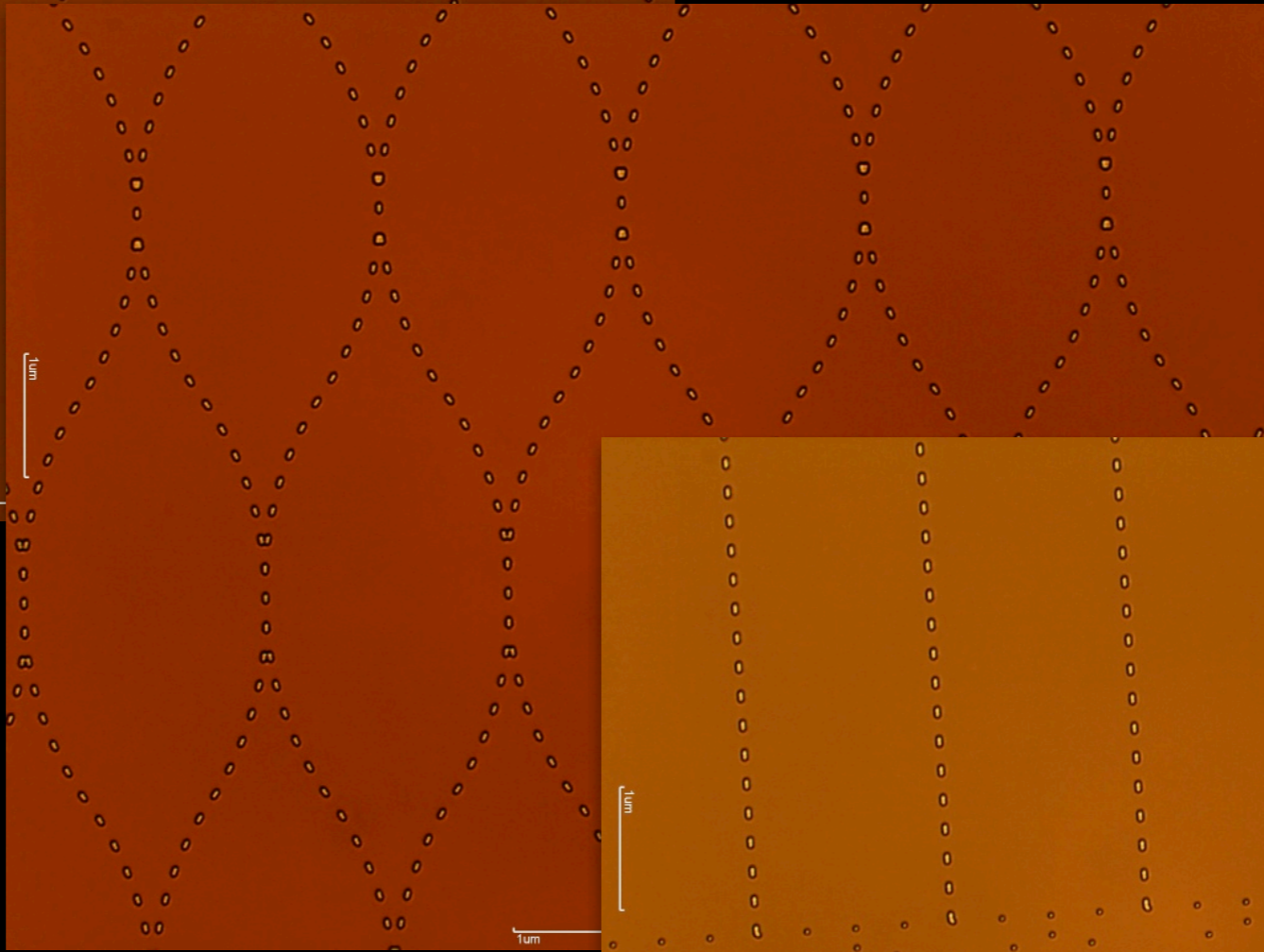
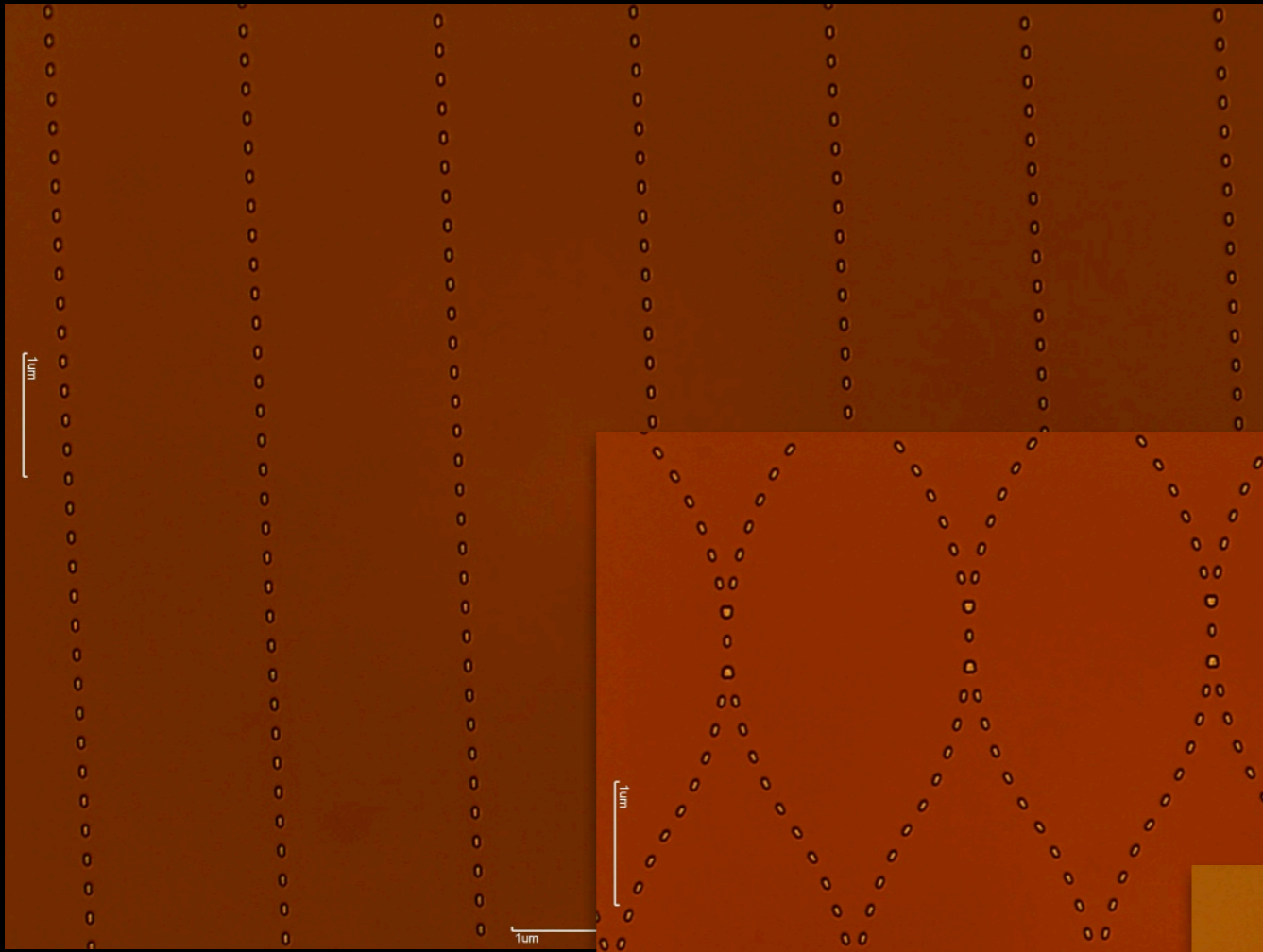
Fabrication

Fabrication

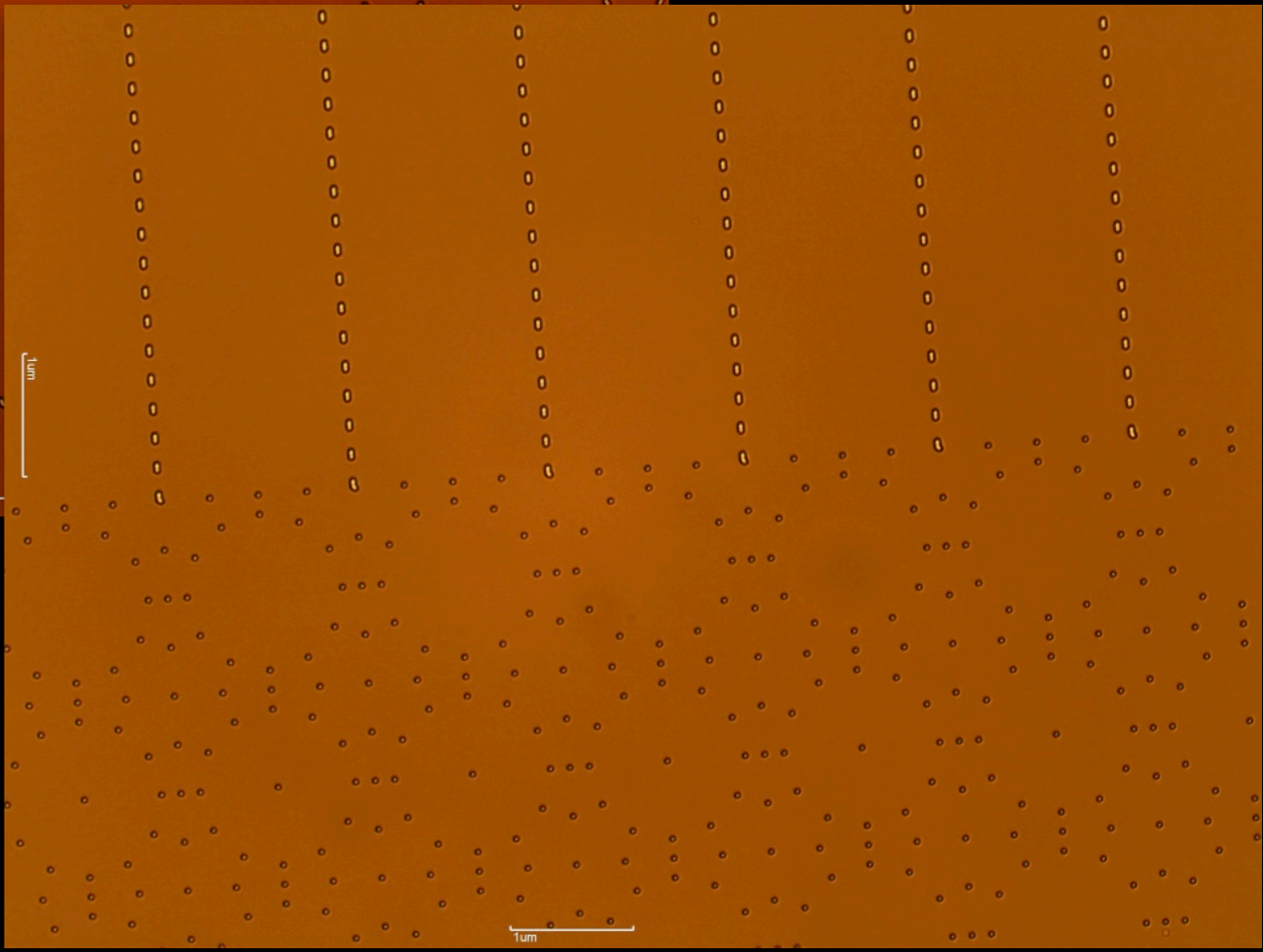
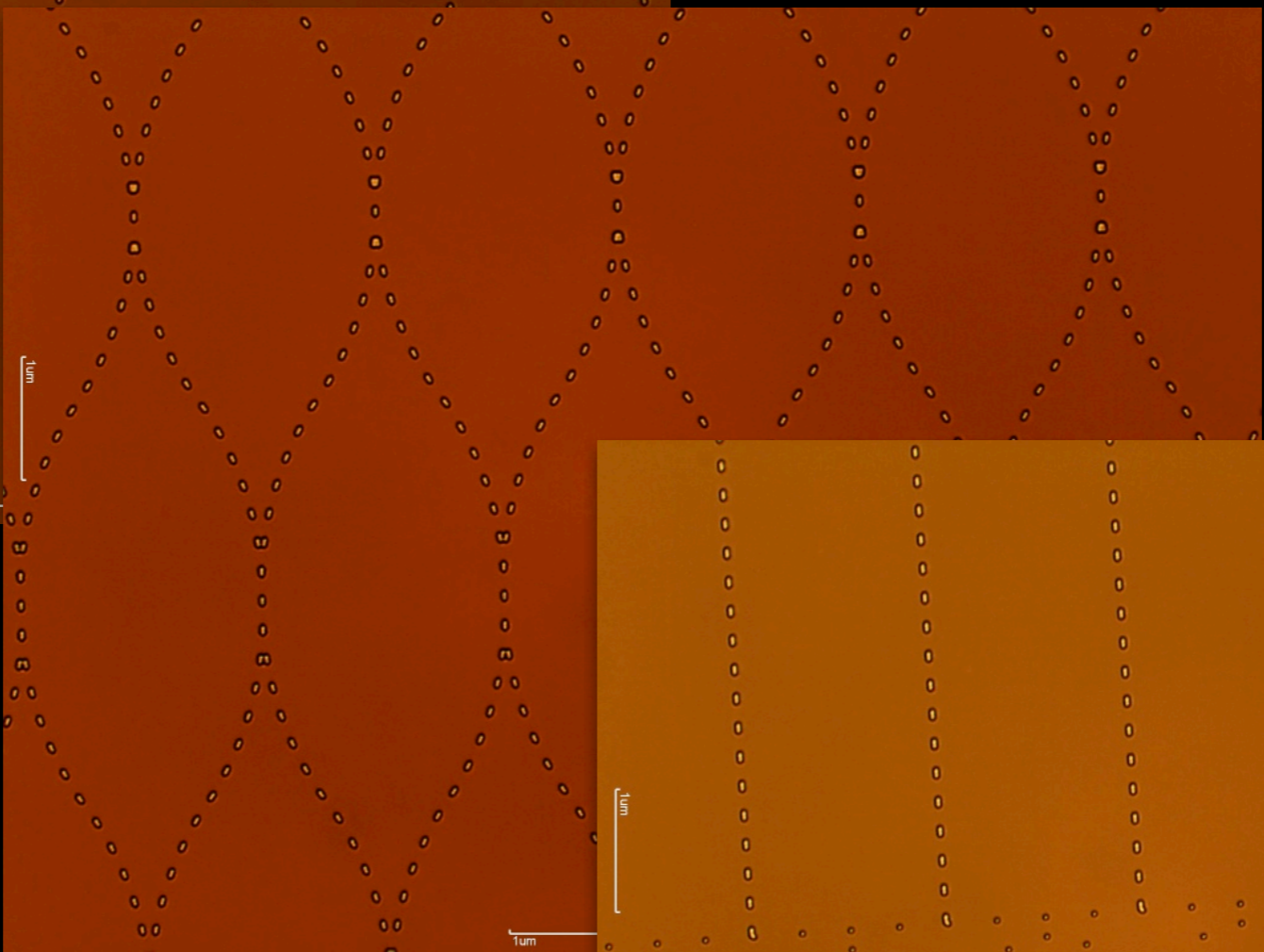
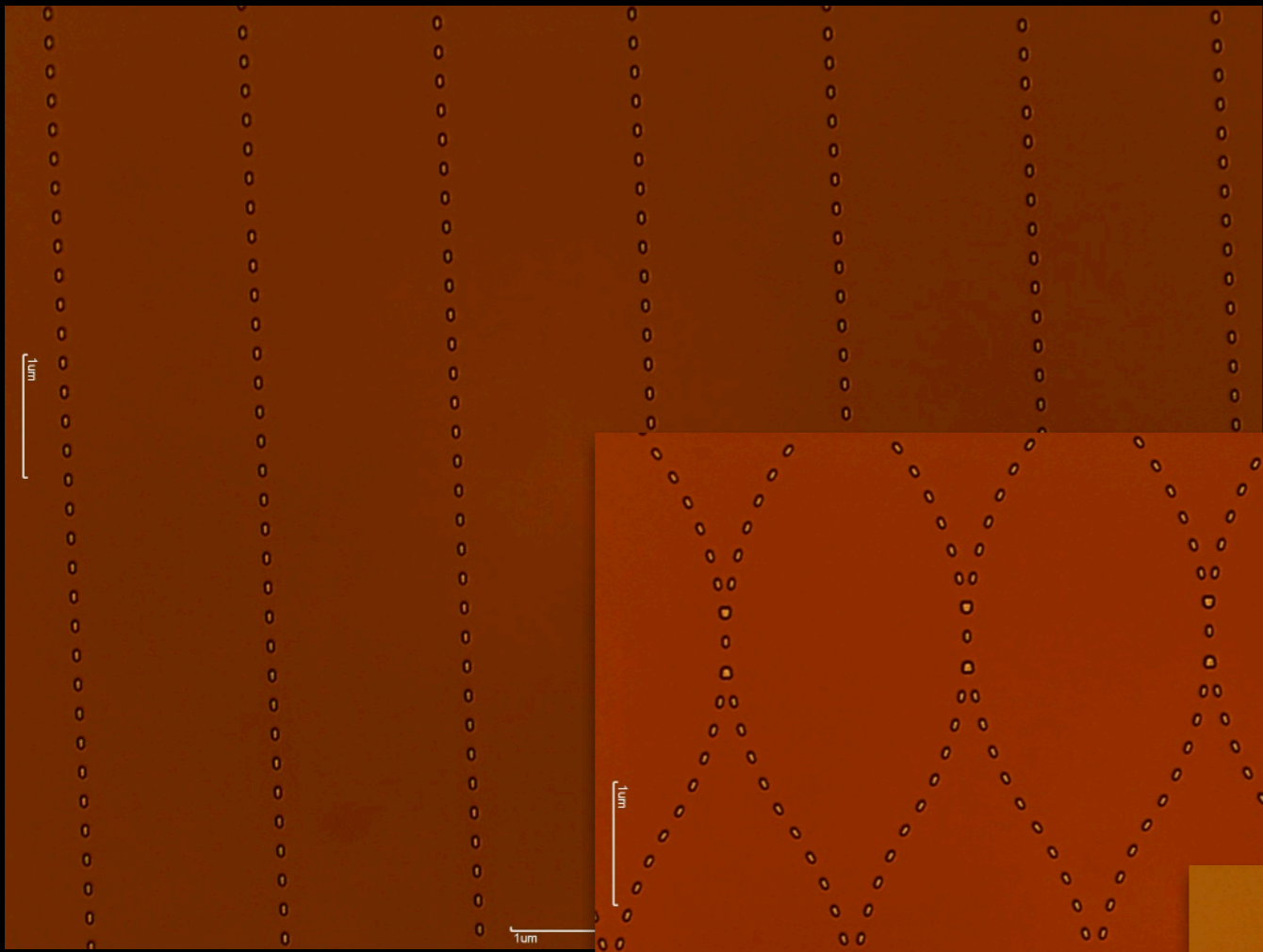


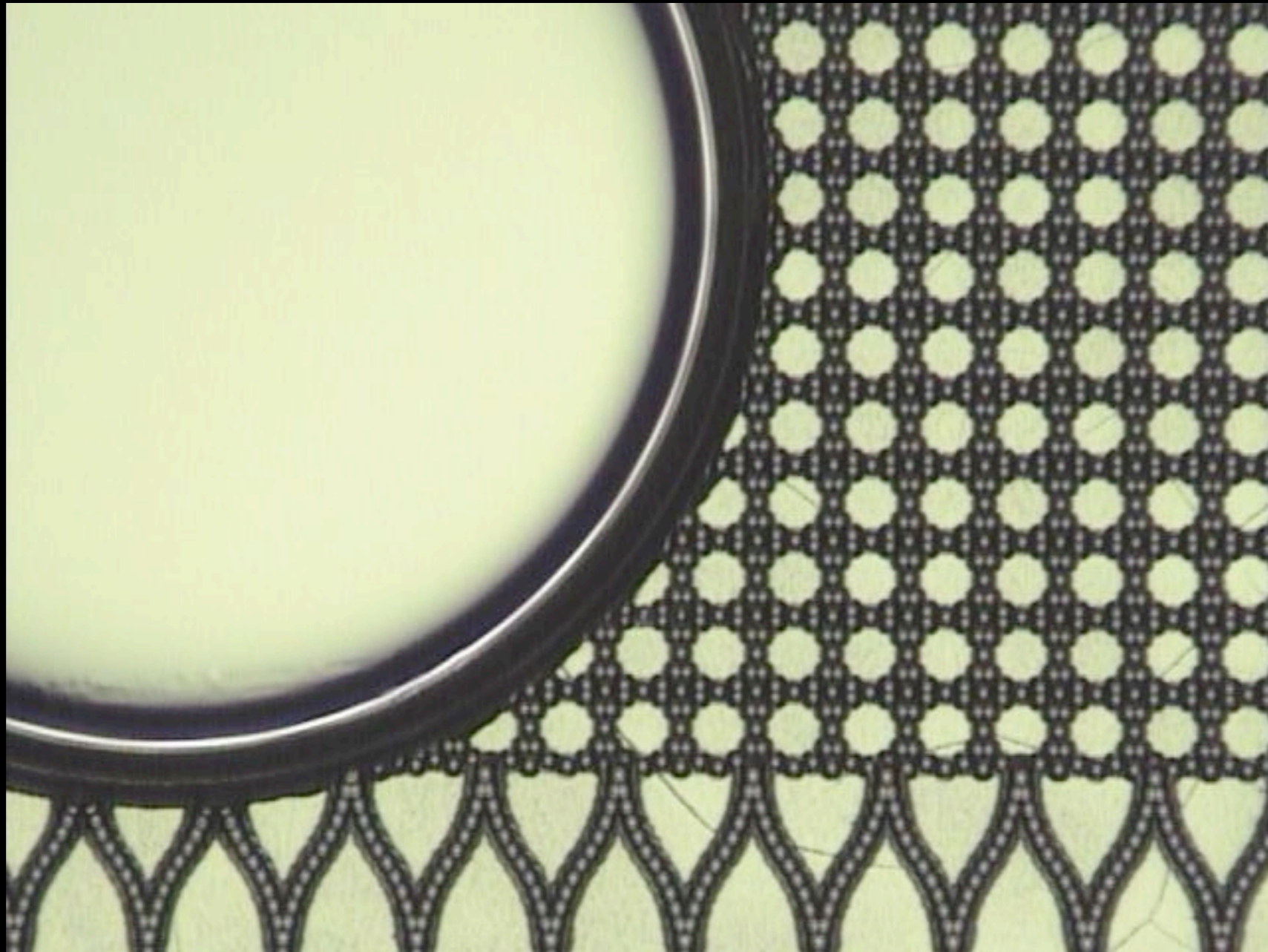


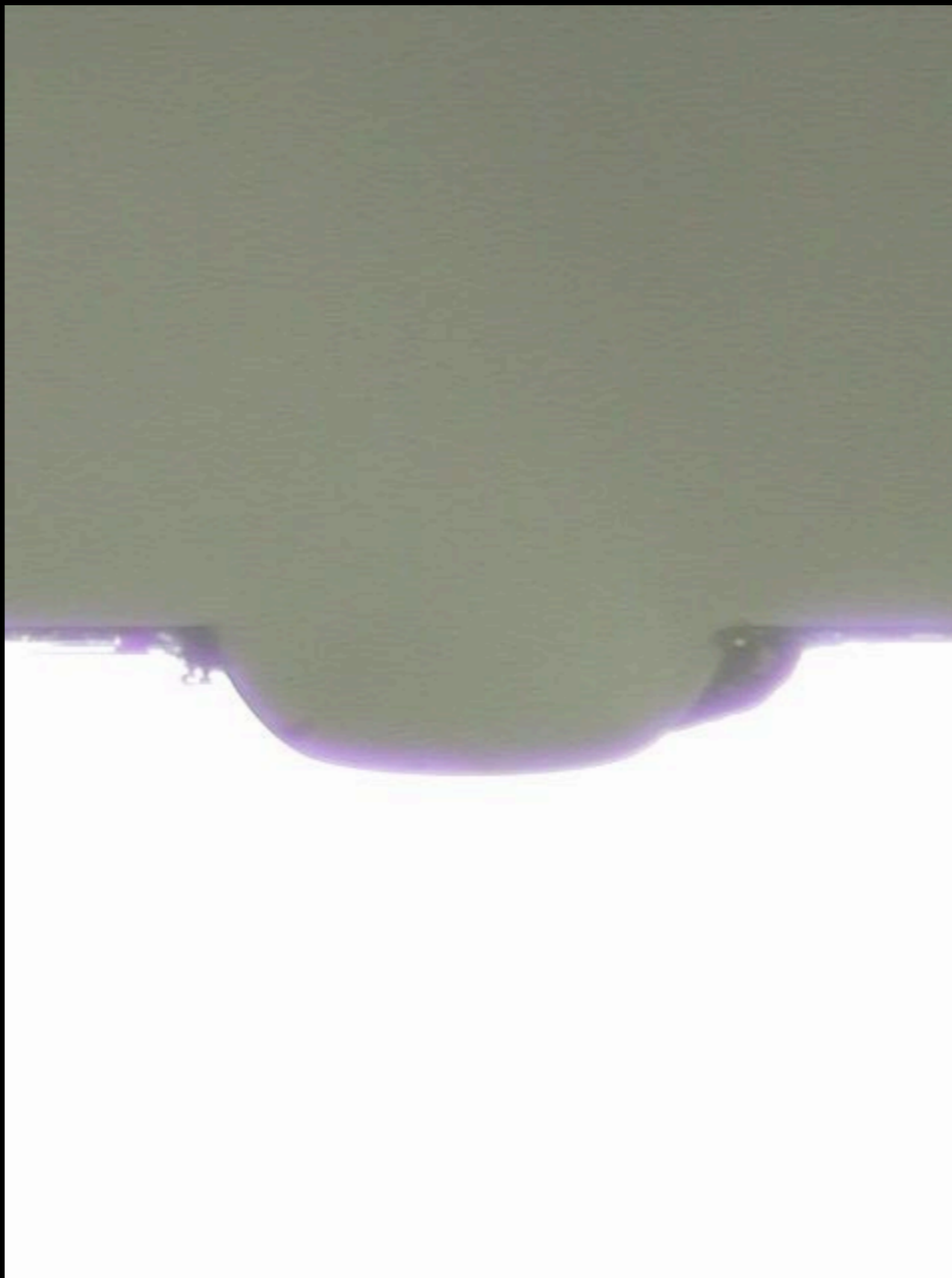




2um

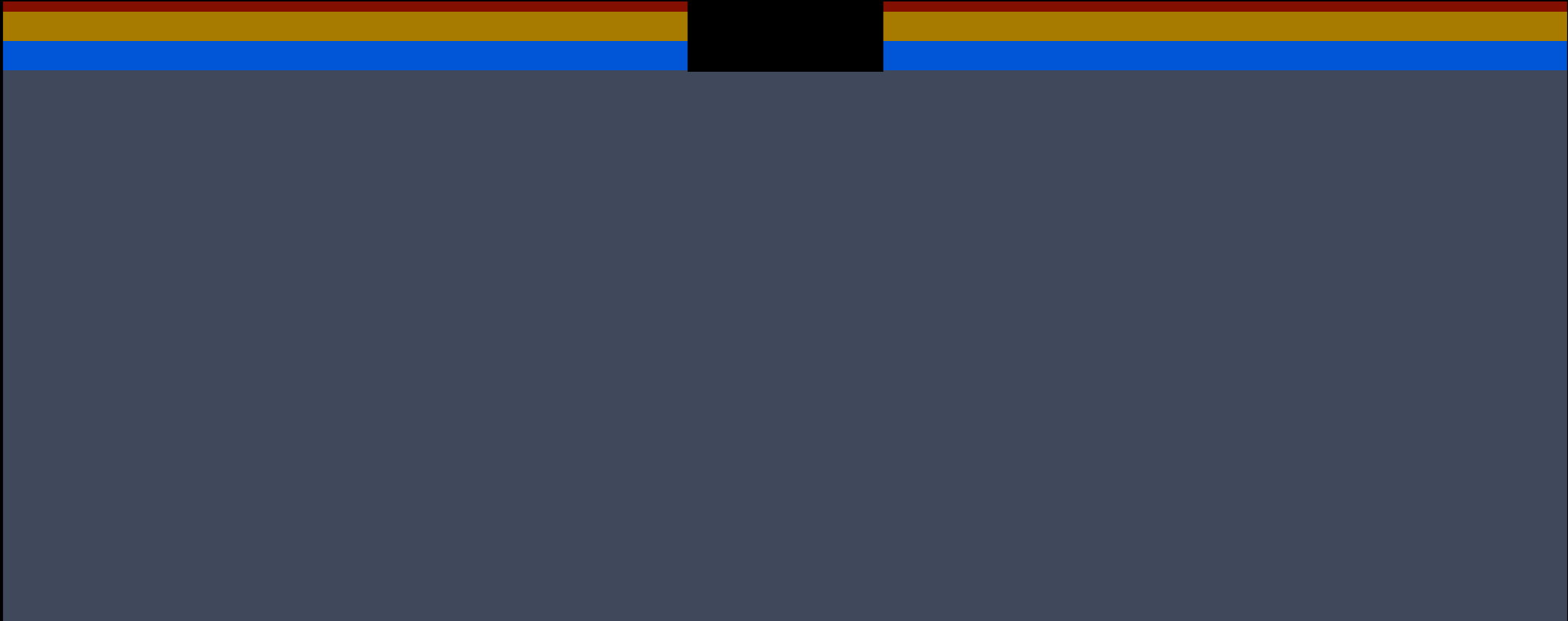


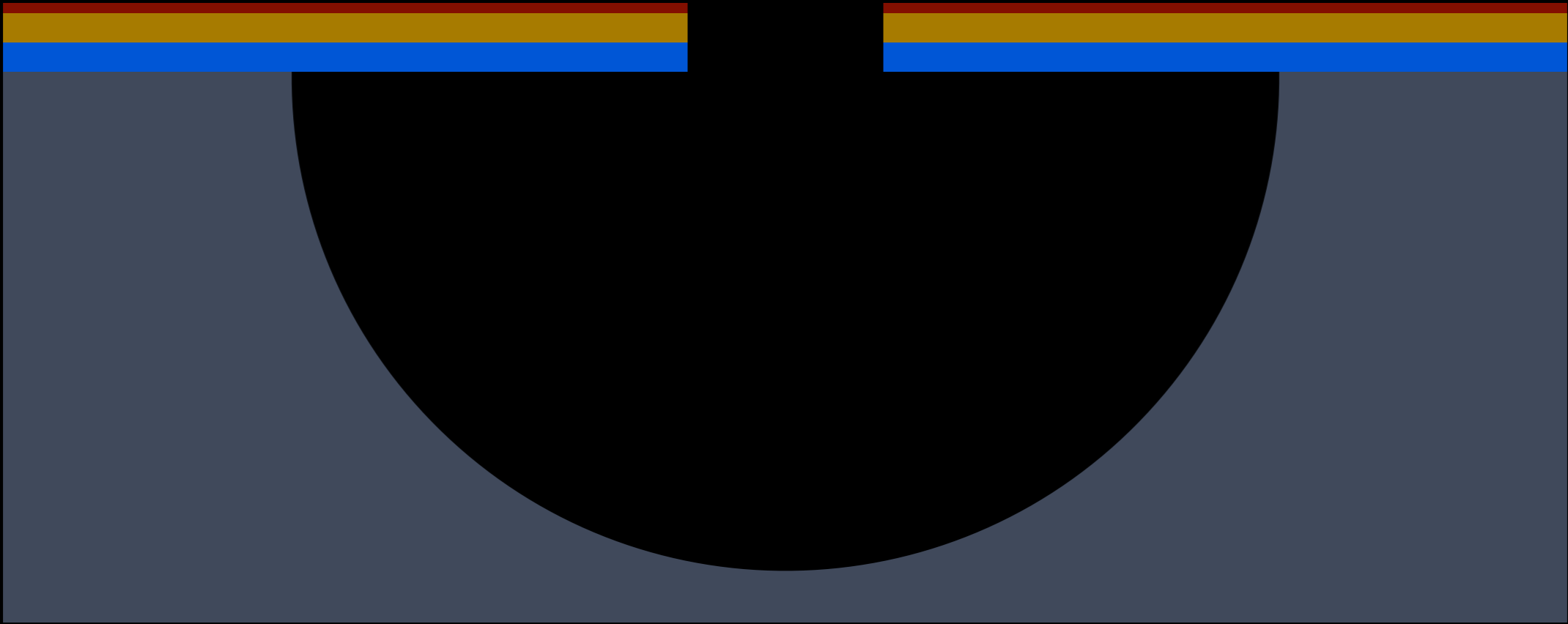




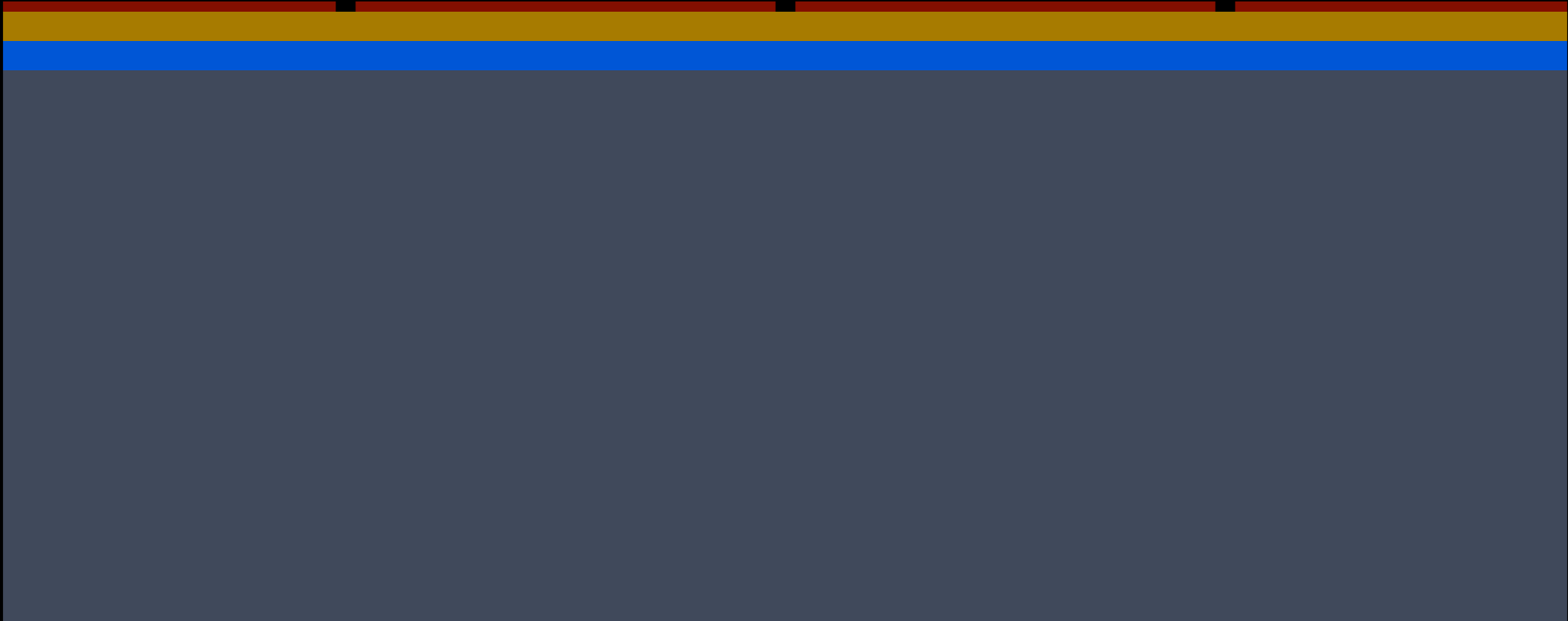


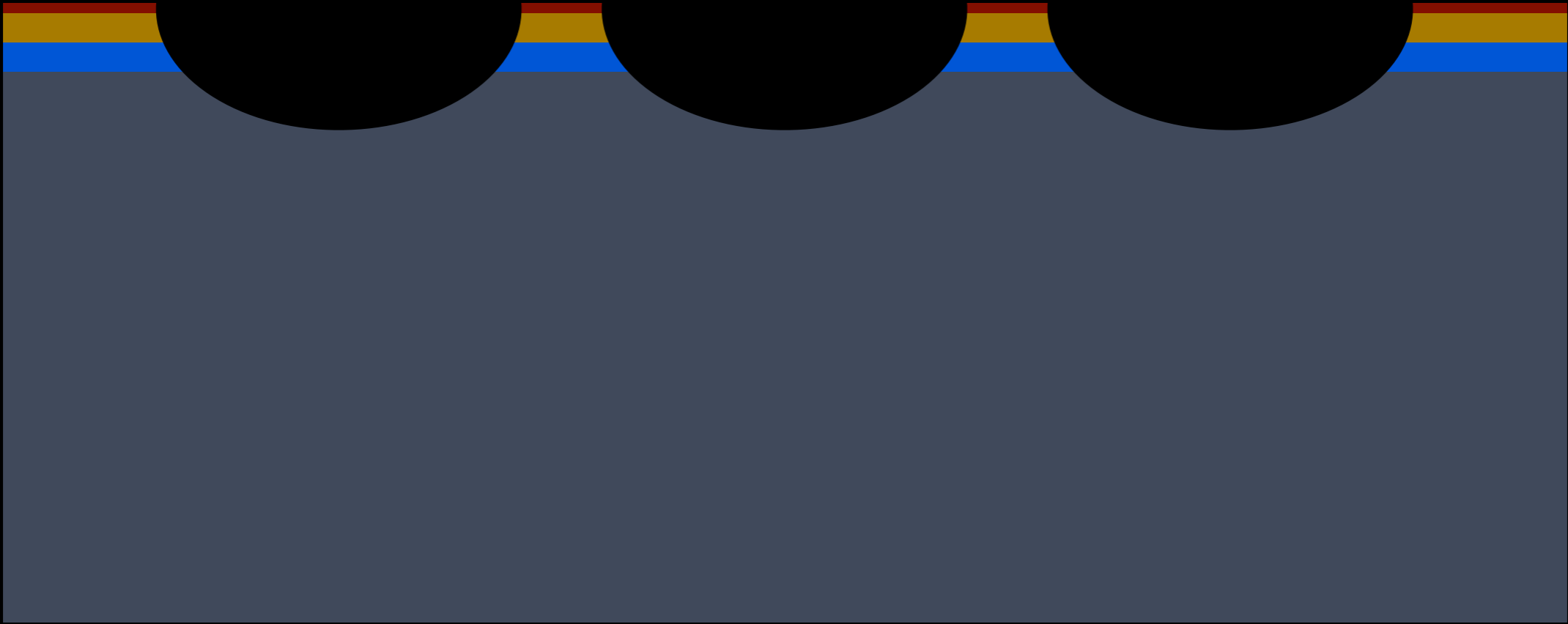


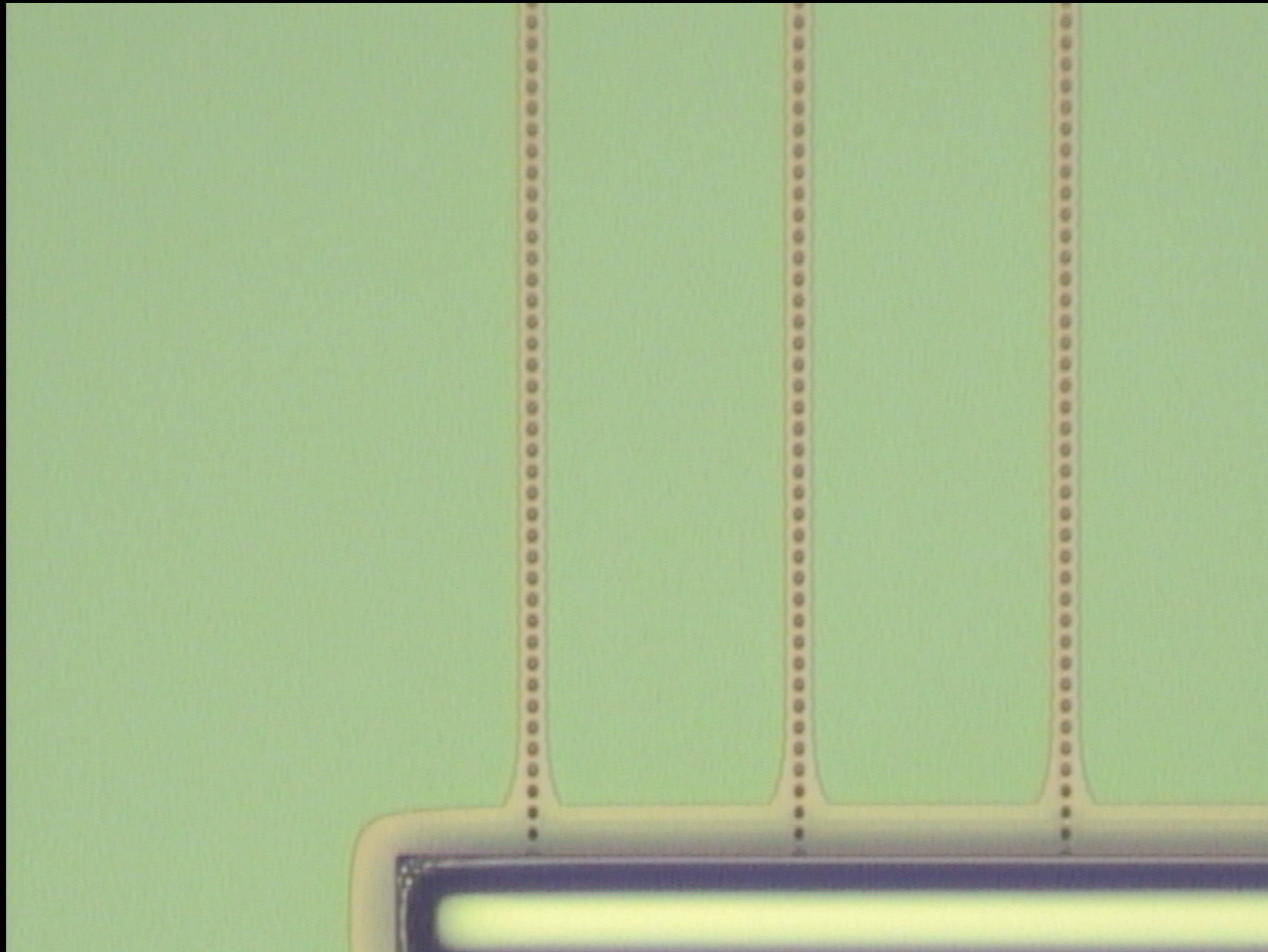


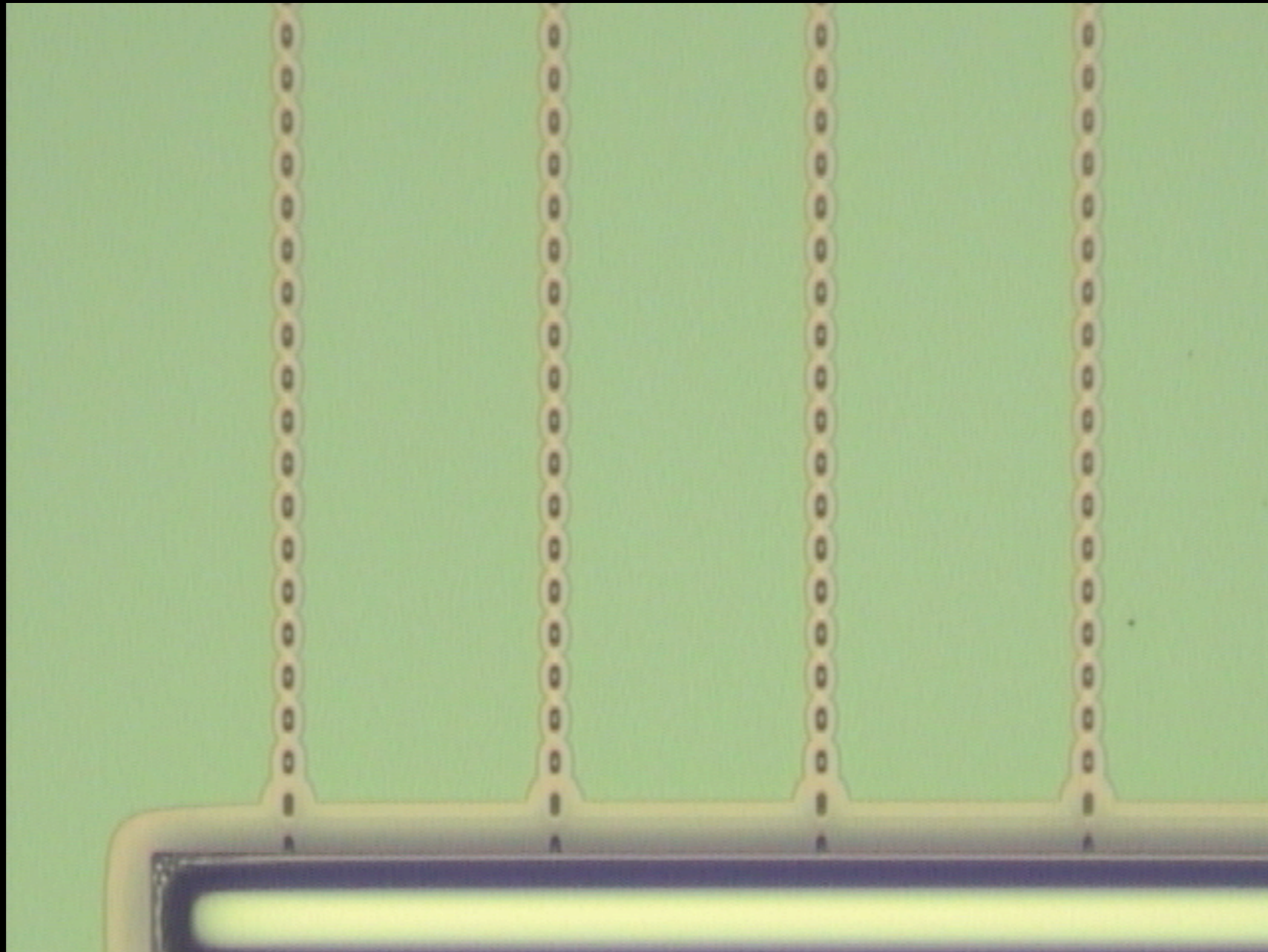












FUTURE RESEARCH

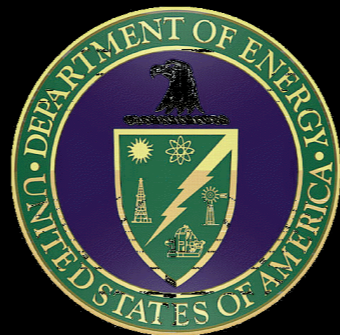
FUTURE RESEARCH

Etch small features

FUTURE RESEARCH

Etch small features

Cooling interface



Chris Kenney

Julie Segal

THANK YOU

Jasmine Hasi

Marco Oriunno

