Basic fab (IL-like)

Process flow

Layout

3D scan + mask, properties

Testing

Dicing

Testing

Packaging

Photolithography - writing in stone w/ light (Danny Hillis, Salem)

Liquid

Spin

Viscous flow

Strong function of viscosity

Weak function of speed, time

0.1 - 20um

0.5 - 2 typ

Single wafer steps

Masks

Wafers

Deep etch

Dicing

2" 25cm

12" 77cm

Bulk, surface, DRIE

Sacrificial etch

Wait lists & website & courses & contact

HW1 - courses, web page

Books - Jaeger

Today - fabrication "single mask process"

Lithography

501 waters

DRIE

HF etch
other ways to apply photo-sensitive film:
- Spray (airbrush, art store)
- Squeegee (flat panel displays)
- Adhesive film

Exposure:
- Light
- Lens
- Mask
- Lens
- Water

(contact)

Bright
dark

Positive resist:
Spaghetti

Negative resist:
Photorecrosslinked

(many opportunities to screw up inversions, mirroring)
Develop:
(weak base)

Hard Bake

Result: chemically inert layer of desired patterns

Also: directwrite e-beam laser (MLA)
How etching
XeF₂

RIE

SCS

- isotropic

SCS

- anisotropic

Thermal oxidation

Heaters

O₂

Heat to 1,000°C

Flow O₂ or H₂O

Low heat

S_i(3) + O₂(s) → S_iO₂(s)

SOI wafer - 2-6 " wafers ~550μm thick

1 μm - 2 μm

W₁

W₂

W₁

W₂

W₁

W₂

Silicon oxide on one or both

Bond (heat, pressure)

Solid & polish

"Handle" wafer, bulk

S_iO₂ 30-200 μm

Device layer: 10 μm - 500 μm

HF etch

- isotropic