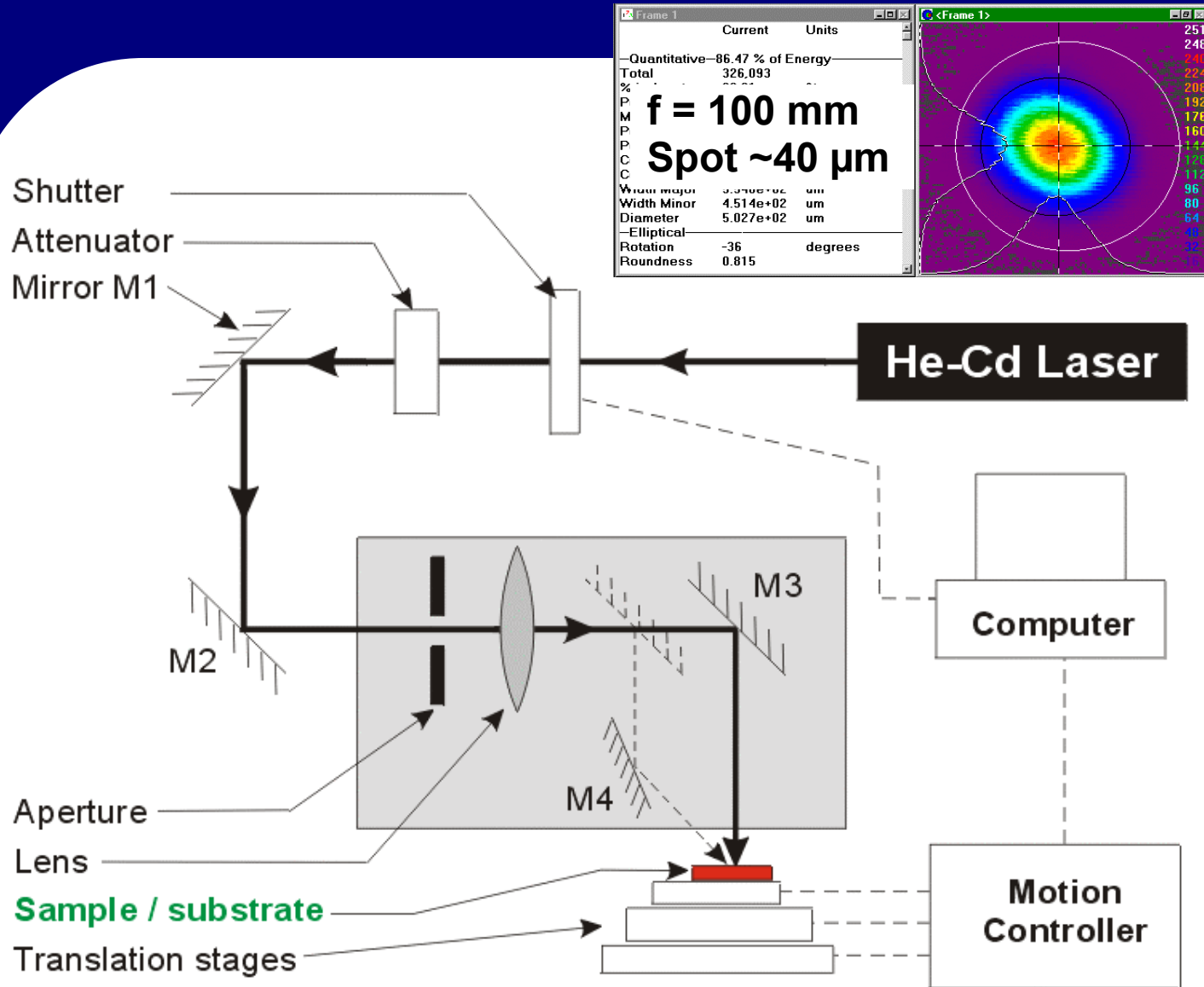


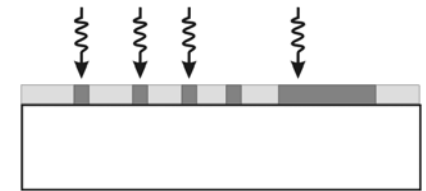
Direct Laser-writing of Polymer



1: APPLY POLYMER
TO SUBSTRATE



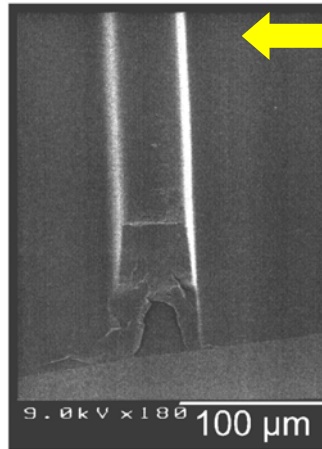
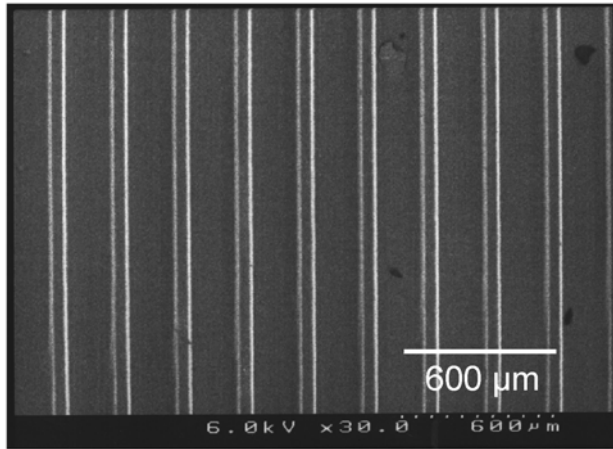
2: LASER WRITE
STRUCTURES



3: DEVELOP POLYMER



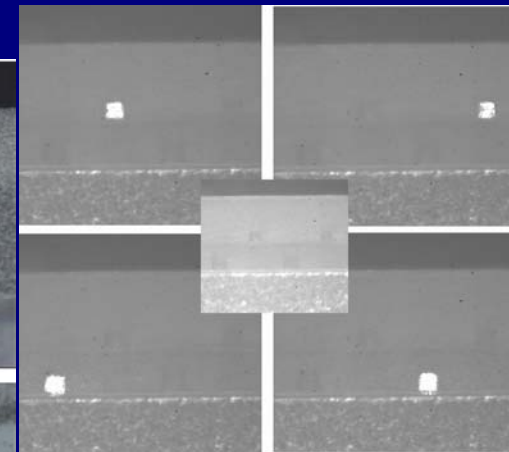
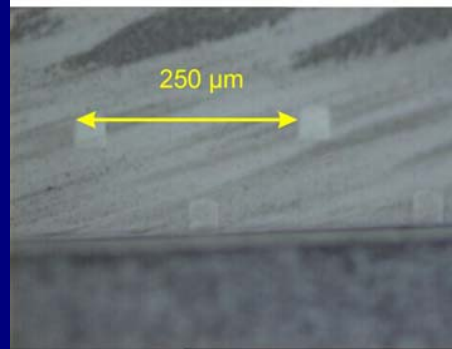
Polymer Waveguides



← **SEM images** showing directly written, **unclad** polymer waveguides ($\sim 50 \times 50 \mu\text{m}$) on a glass substrate. The waveguides are on a $250 \mu\text{m}$ pitch and the cross section of one of the guides is shown on the left – it was cut using a razor blade.

Optical Microscope images of stacked waveguides

- Waveguide cores are $\sim 36 \mu\text{m} \times 36 \mu\text{m}$
- Cladding applied using the doctor blading technique
- 0.5 mW , $500 \mu\text{m/s}$



45° Polymer Structures

Scan speed = 200 $\mu\text{m/s}$
Optical power = 0.25 mW
(Beam at 45° to substrate)

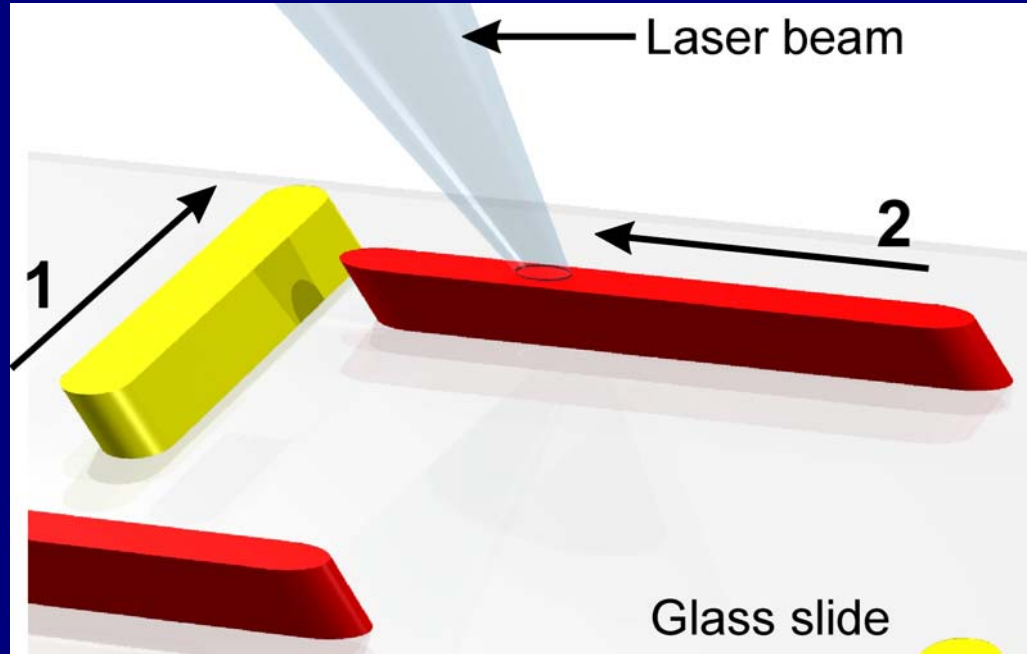
(a)

5.0 kV x130 138 μm

(b)

30 μm

5.0 kV x600 30.0 μm



(c)

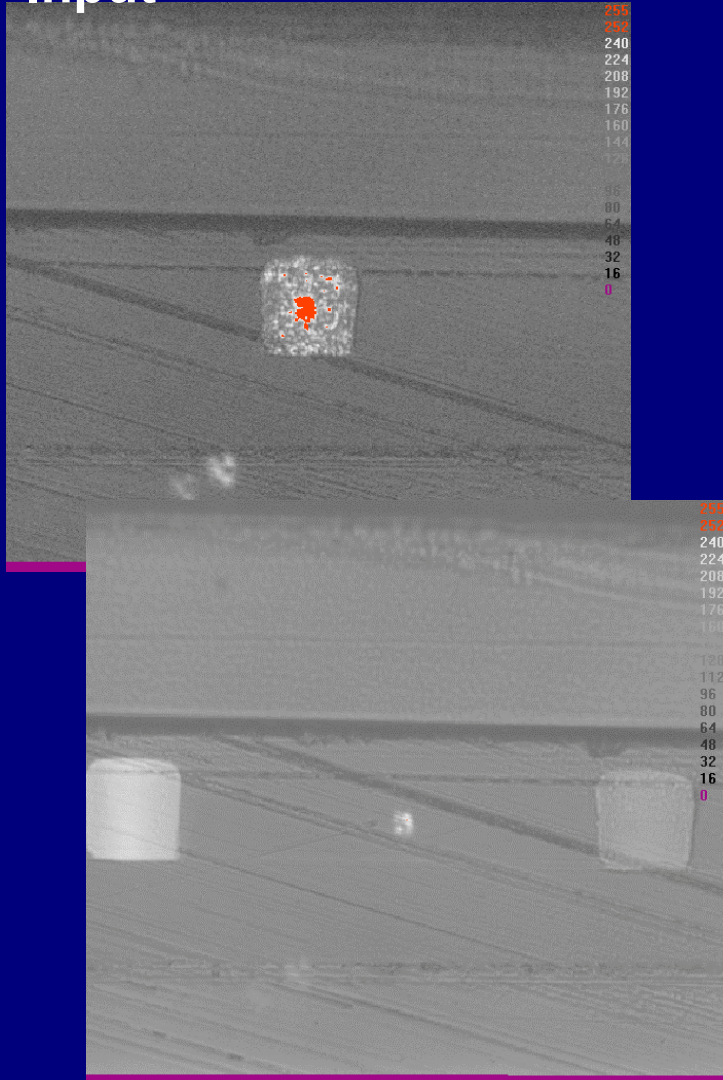
7.0 kV x200 90.0 μm

(d)

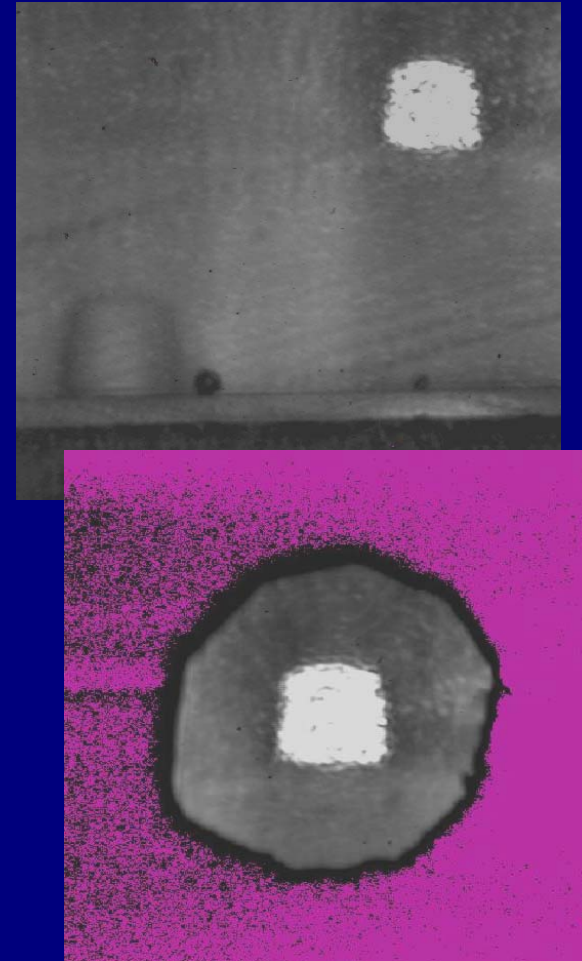
5.0 kV x300 60.0 μm

Characterisation: Waveguides & Mirrors

Input



Output



Characterisation of Bump Writing Process

Model & Measured Bump diameter v Dwell time

for a fixed spot size $2\omega = 40 \mu\text{m}$

