

Ultrafast Laser Inscription (ULI) for biophotonics applications

SUPA PALS Open Day
27th February 2013

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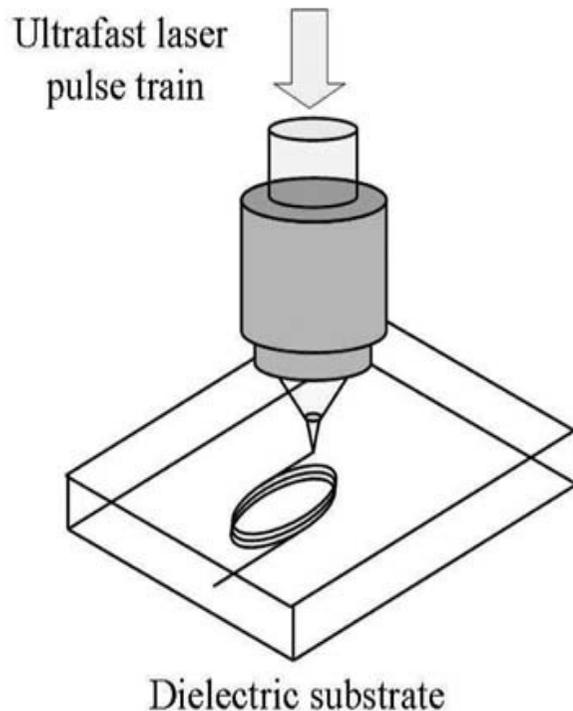
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ULI process

Process Control

- X fs-laser pulses (50-500 fs)
- X xyz stages
- X Focusing objective(0.07 NA - 1.4 NA)
- X Etching facility (HF/ KOH)



Advantages

- X No clean-room
- X 3D fabrication freedom
- X Material flexibility
- X Rapid prototyping
- X Embedded structures

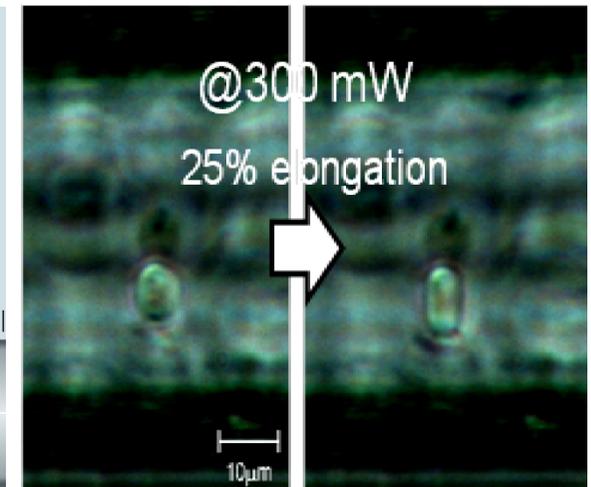
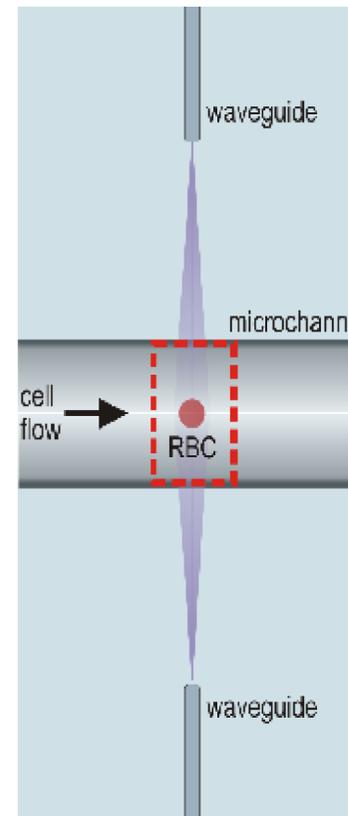
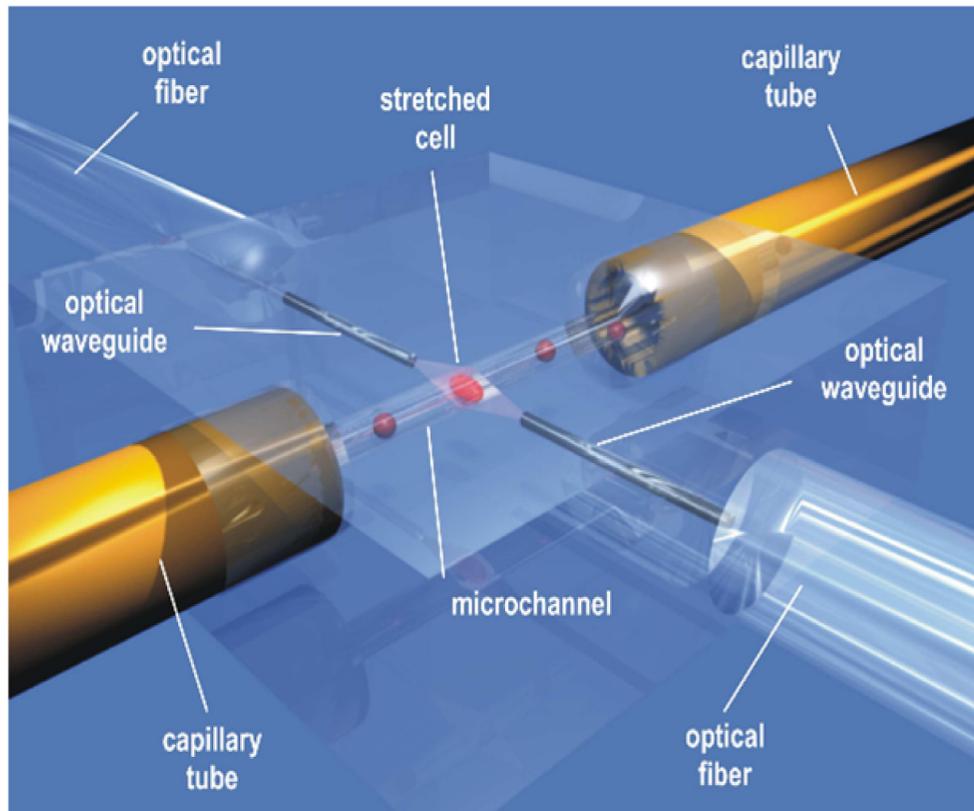


Applications

- X Active/ Passive photonic devices
- X Micromechanical systems and sensors
- X **Biochips**
- X Laser Welding

ULI enabled applications

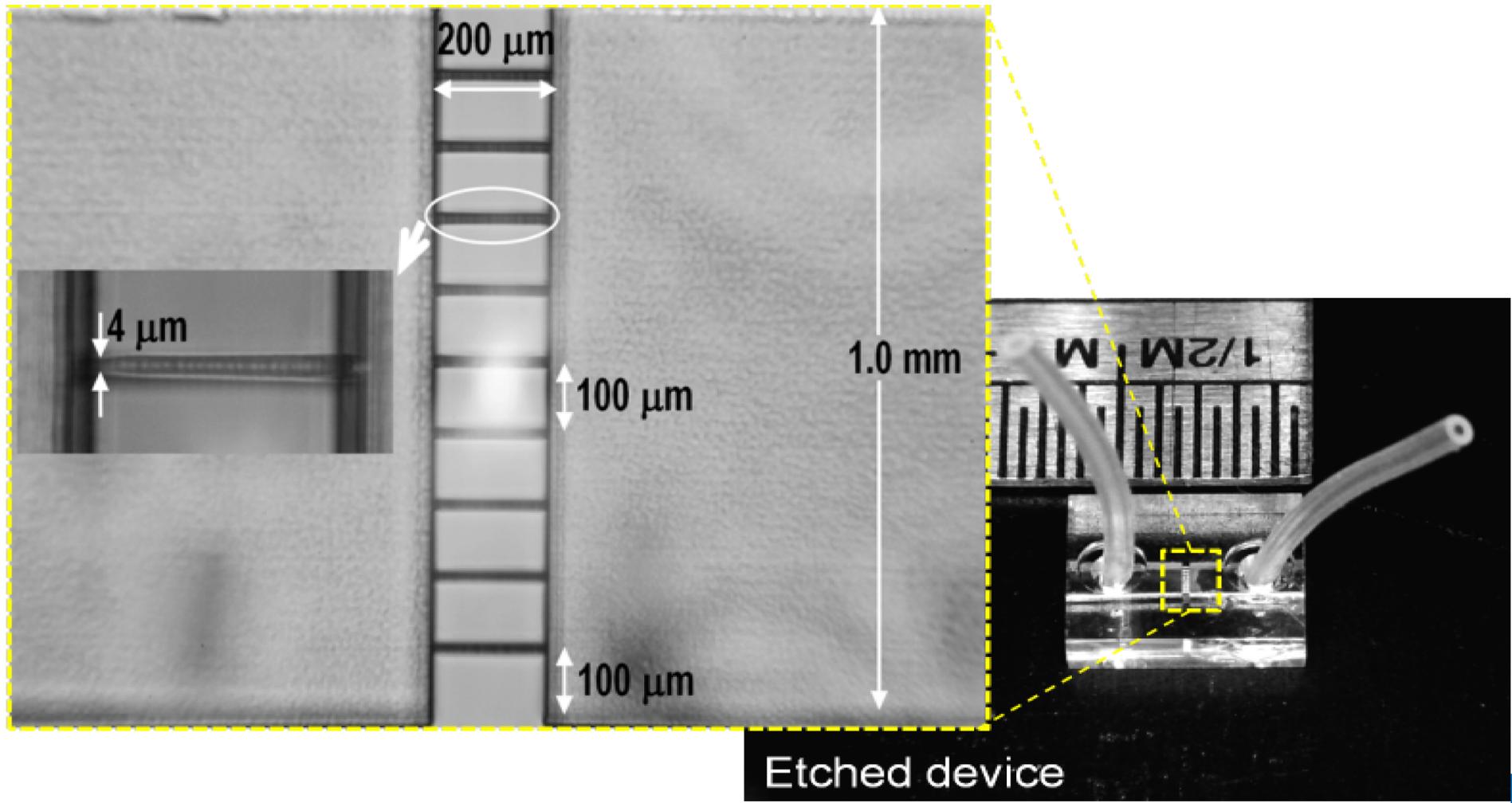
Dual beam optical traps



N. Bellini *et al.* Optics Express **18**(5), 4679-4688, (2010)

ULI enabled applications

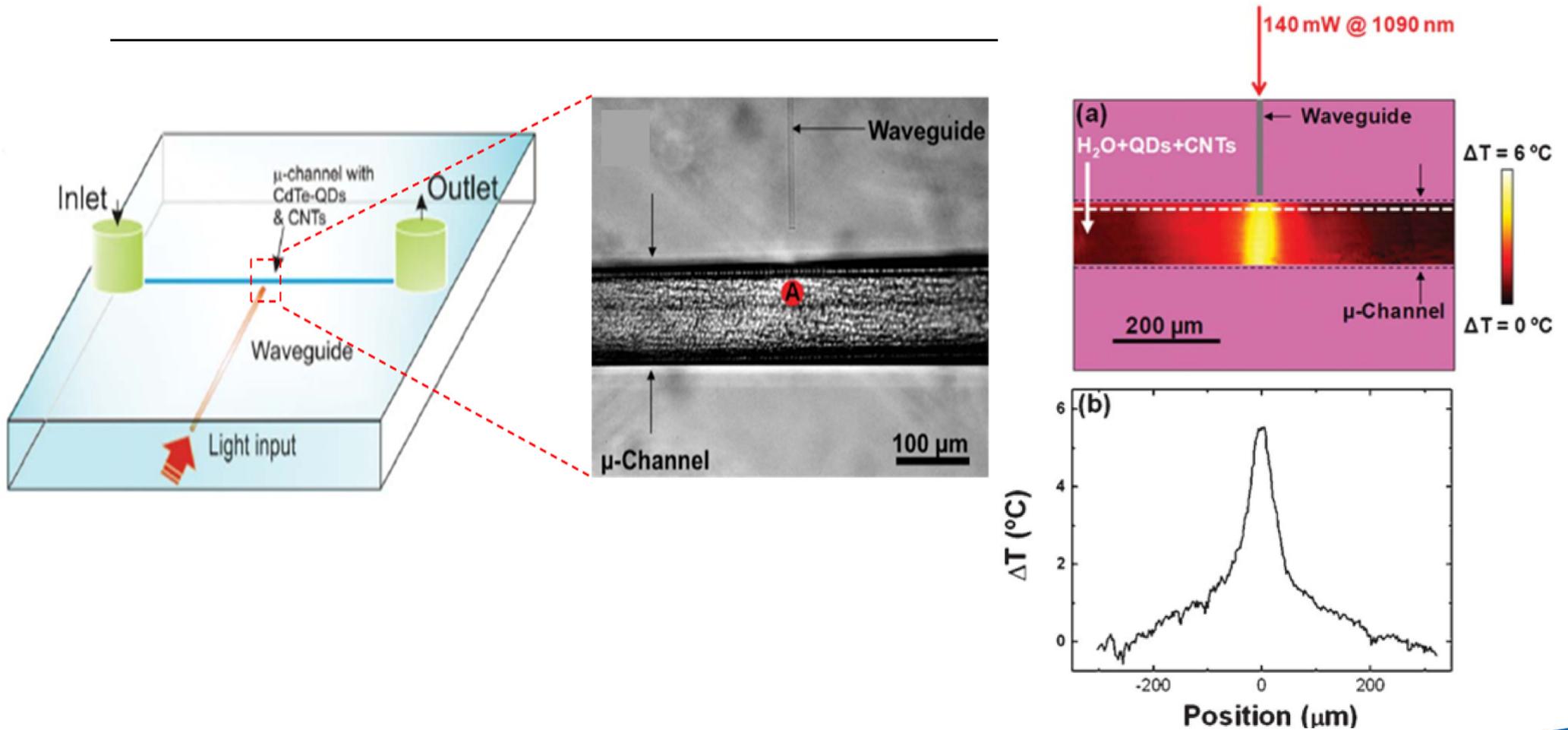
μ -channel networks for high throughput cell manipulation



D. Choudhury *et al.* Lab Chip **12**, 948-953, (2012)

ULI enabled applications

μ -channel thermometry



D. Choudhury *et al.* Lab Chip **12**, 2414-2420, (2012)

Conclusions

- Integrated multifunctional devices
- Repeatable – Reliable – Alignment free
- High aspect ratio fluidic channels and micro-optic circuits.

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- Non-invasive probes and biosensing
 - Growth and maintenance of difficult to culture cells
 - μ -structured biocompatible surfaces
 - Nanofluidics