

# Bio on Chip

B98901072 陳彥君

B98901187 柯有為

B98901196 楊宗衡

# Outline

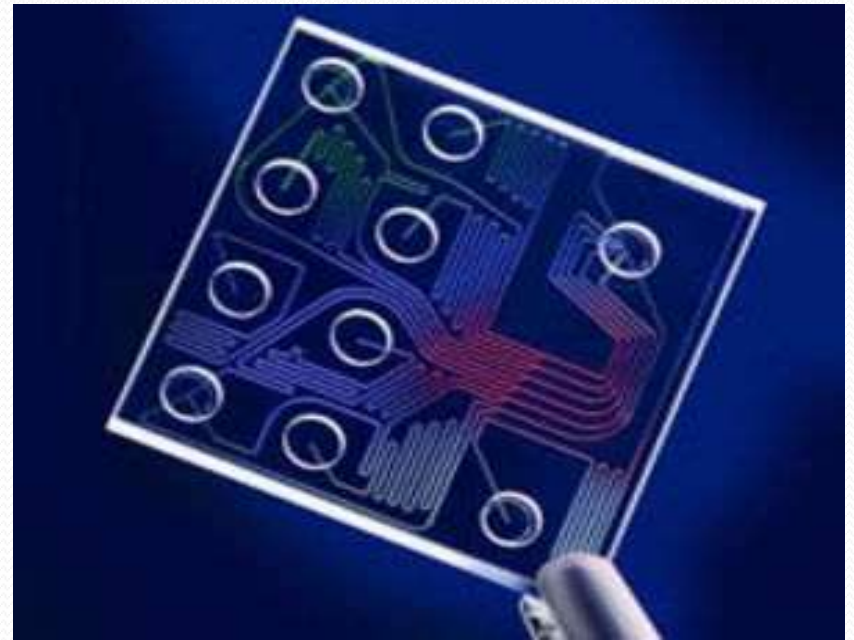
- Lab-on-a-chip (blood detection)
- Organ-on-a-chip (lung chip)
- Organ-on-a-chip (kidney chip)

# Lab-on-a-chip (LOC)

Conventional Lab



Lab on a Chip



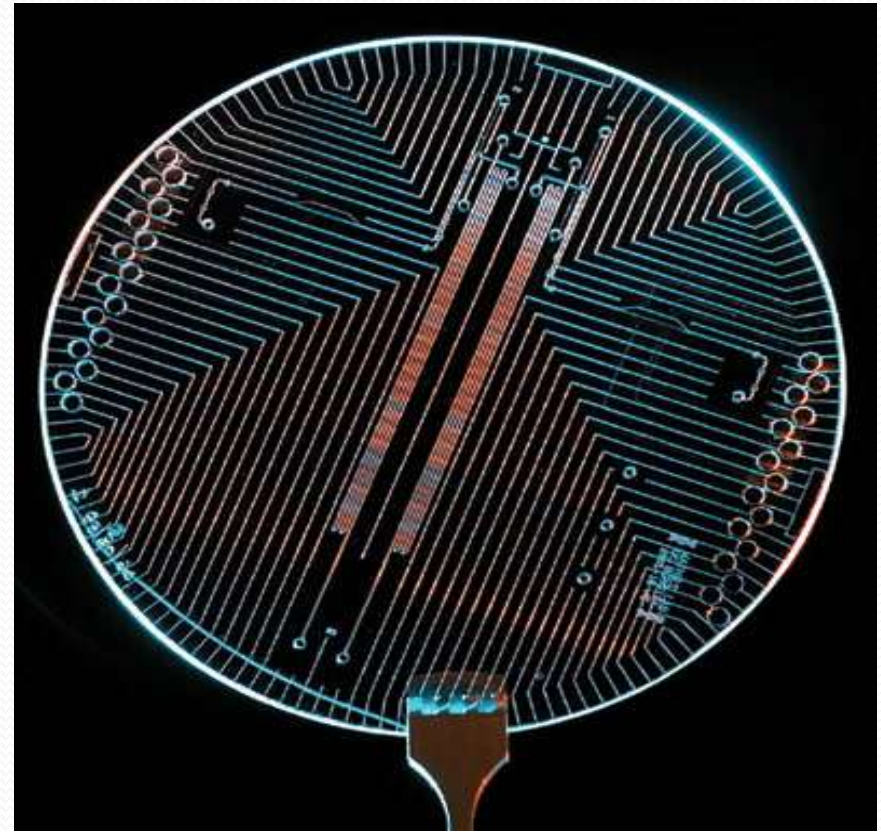
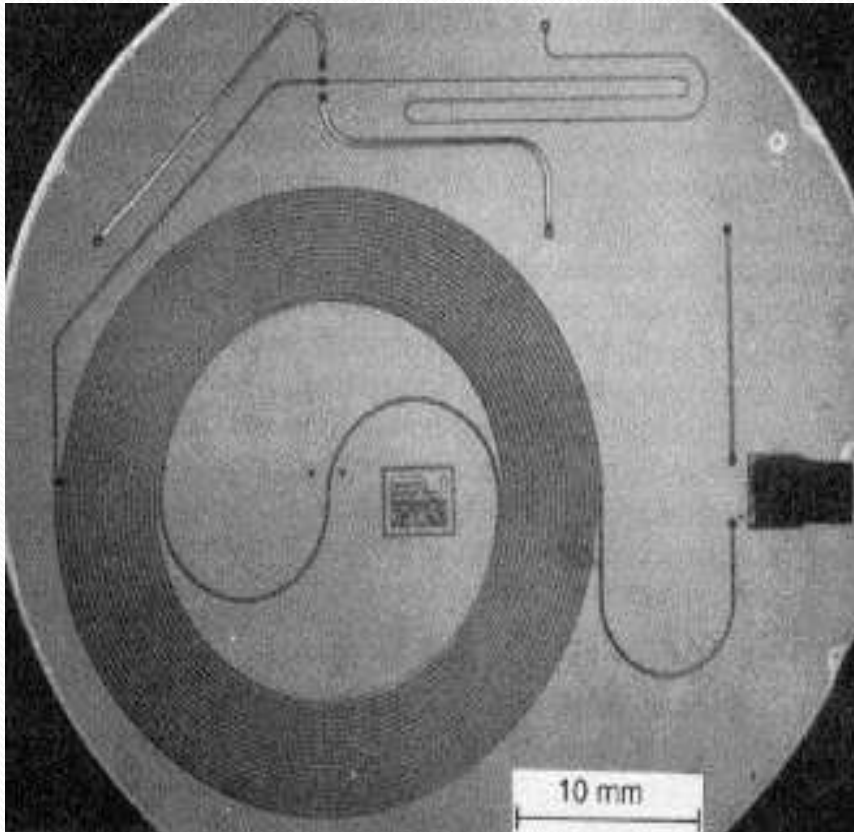
# The History

- The researches start at 1960s.
- In 1979, a complete gas chromatograph on a single 'chip' was developed at Stanford University and published.
- In the 1980s and 1990s, the LOC field moved rapidly.

# The History

1979 Stanford GC

2006 UC Berkeley



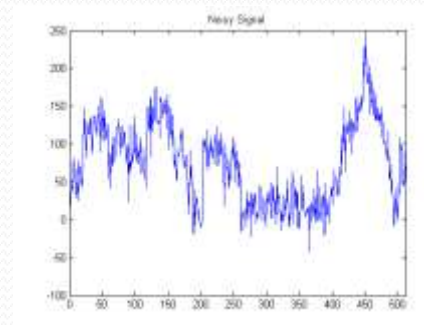
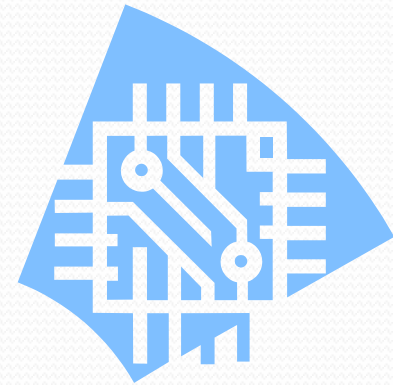
# Advantages

- Lower cost (samples, chips)
- Faster analysis (about few minutes)
- Better process control
- Safer platform

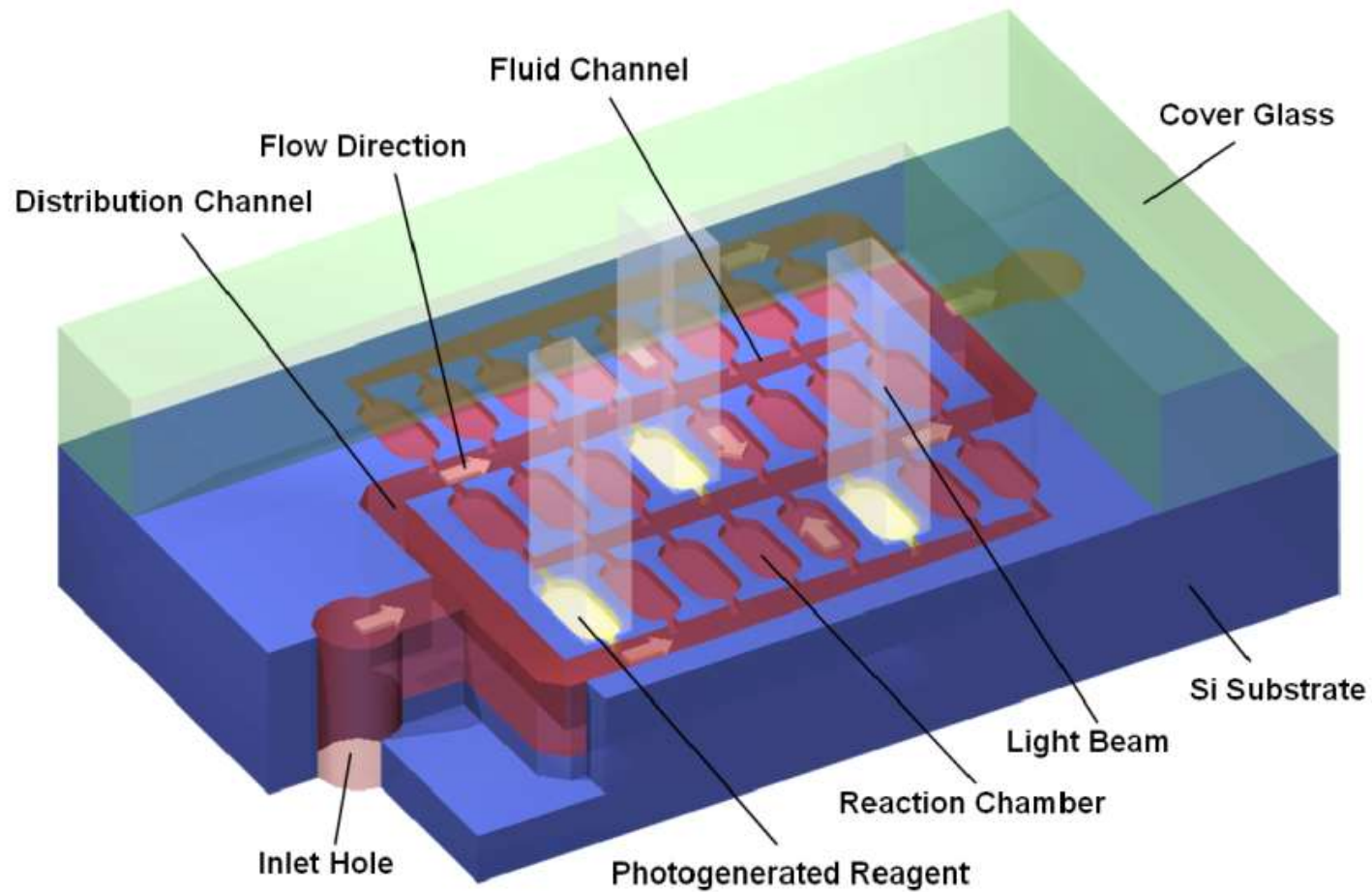


# Disadvantages

- Too novel, not yet full developed
- Physical and chemical effects
- Low SNR in small scale



# Example: Blood Detection





# Example: Blood Detection



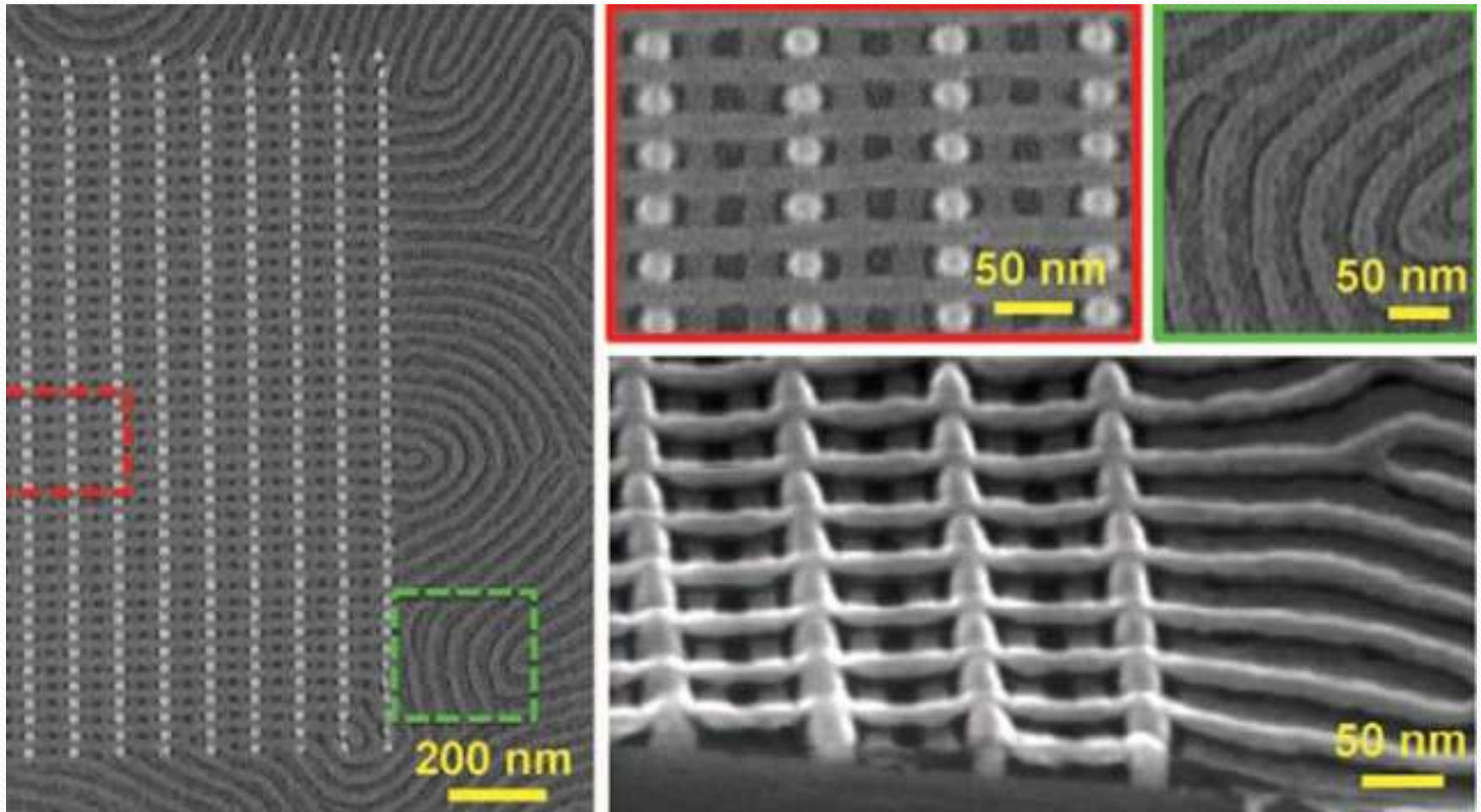
# Structure

- NANO Structure
- Reaction Chamber
- Detection Chamber

# Part1: NANO Structure

- To block larger substances like red blood cell
- Separate those substance we are interested in

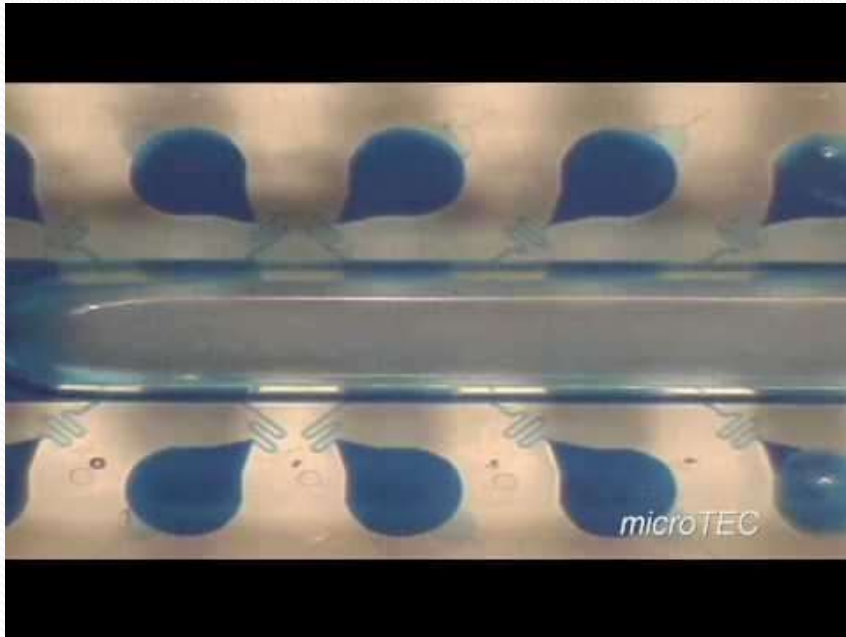
# Part1: NANO Structure



# Part2: Reaction Chamber

- The specific reactions occur.
- Different proteins catch the target respectively.

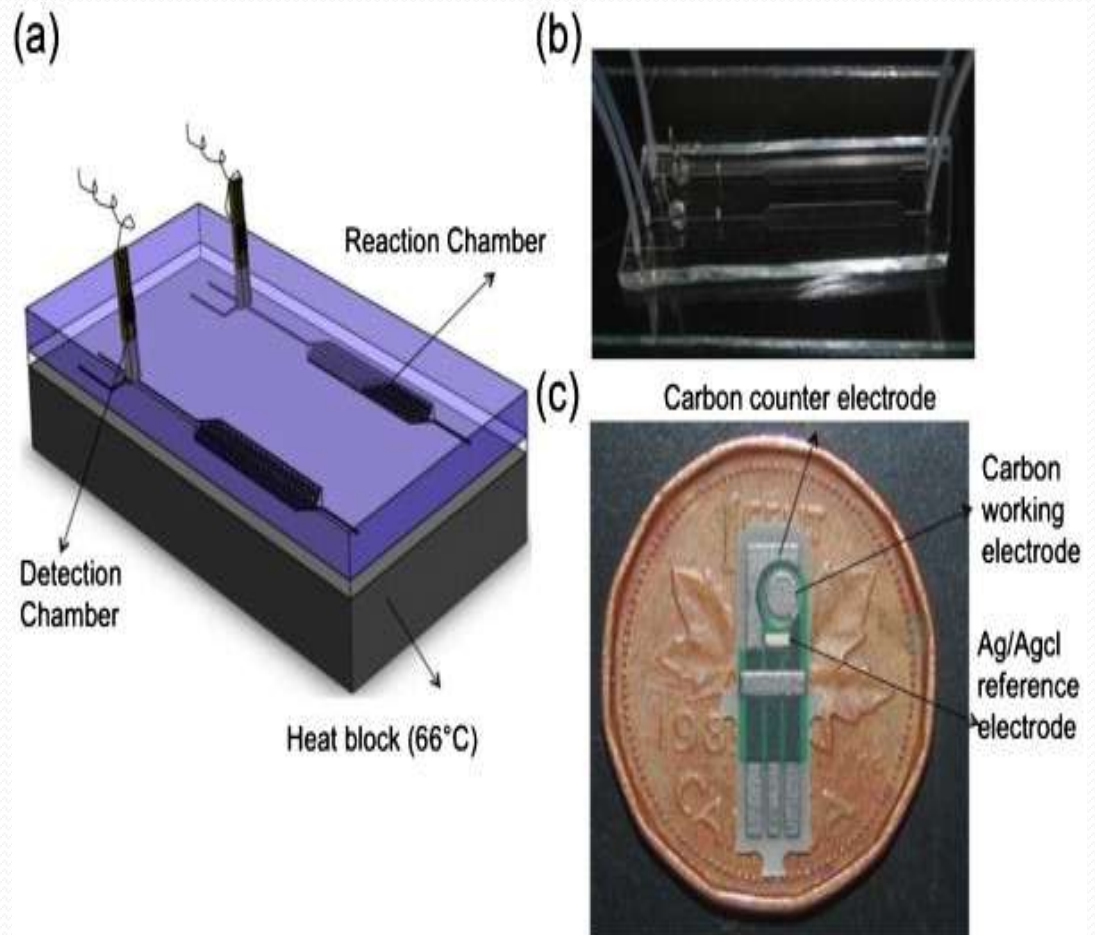
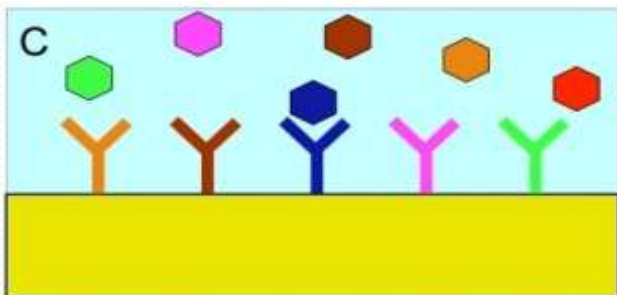
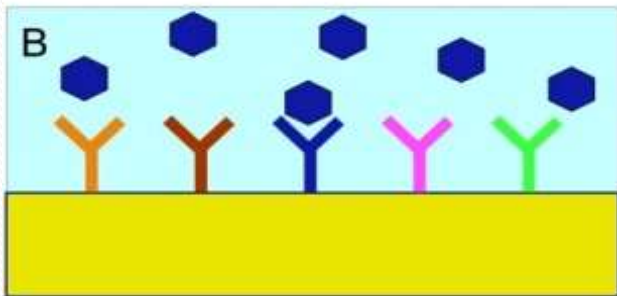
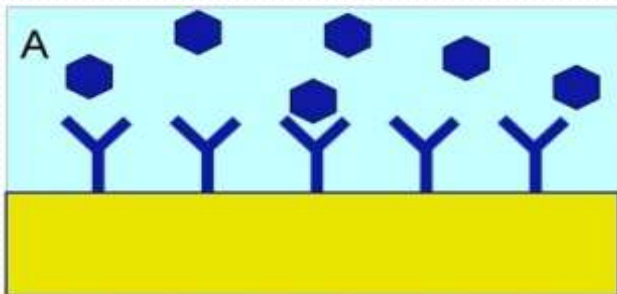
# Part2: Reaction Chamber



# Part3: Detection Chamber

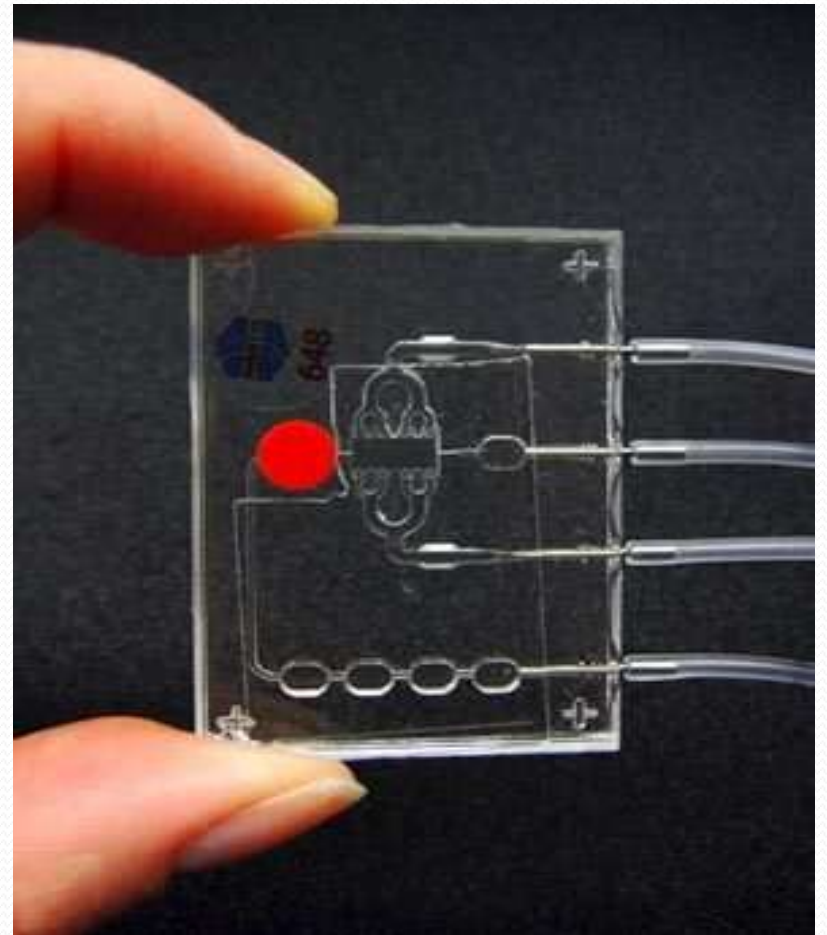
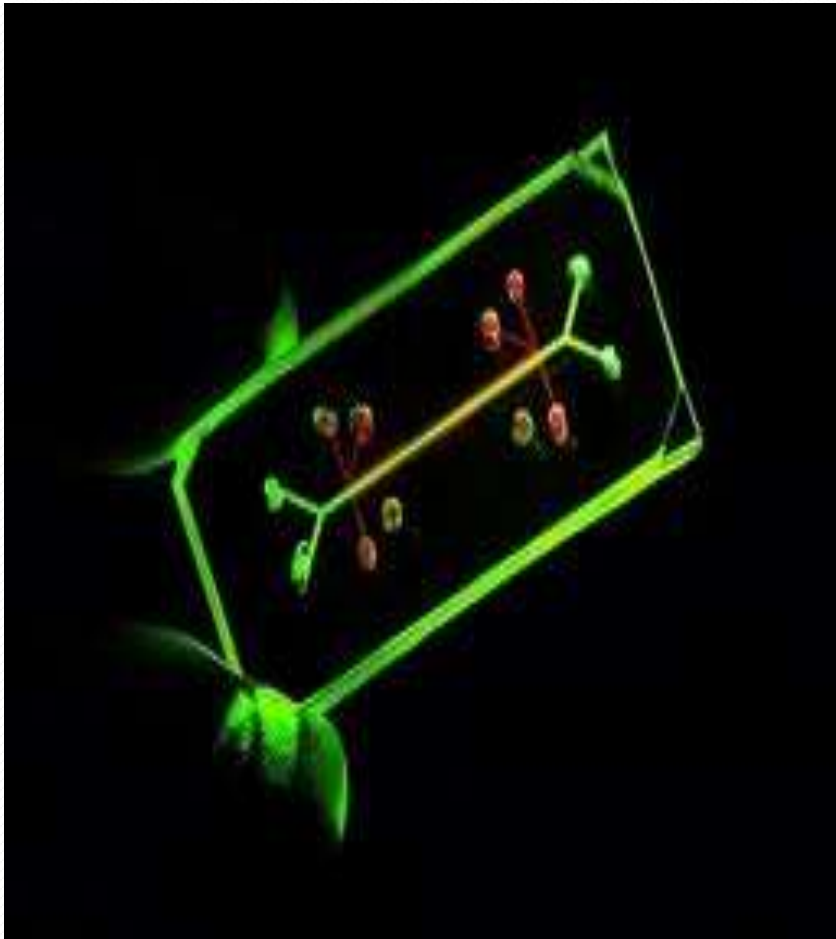
- Caught by the corresponding bases.
- Prepare to be analyzed and further studies

# Part3: Detection Chamber

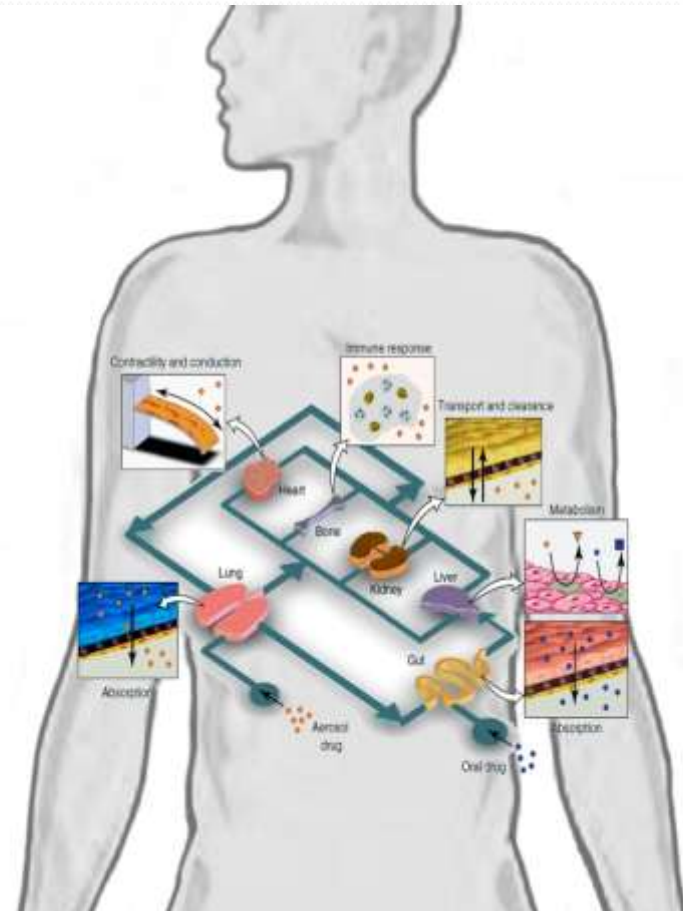
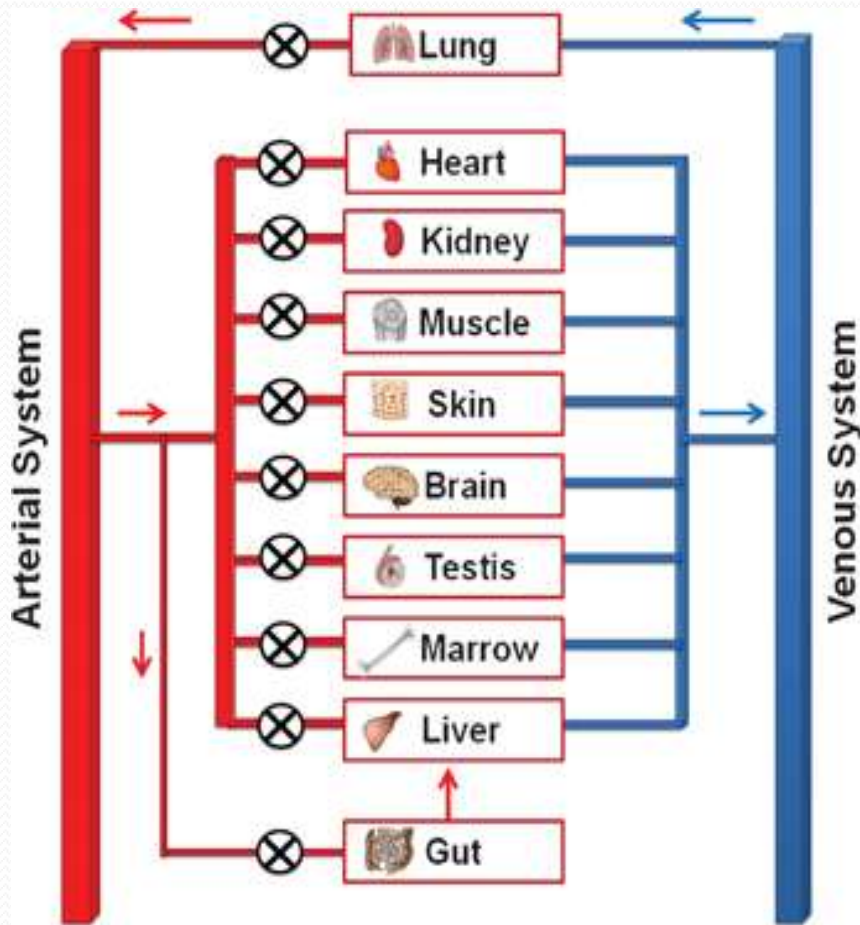




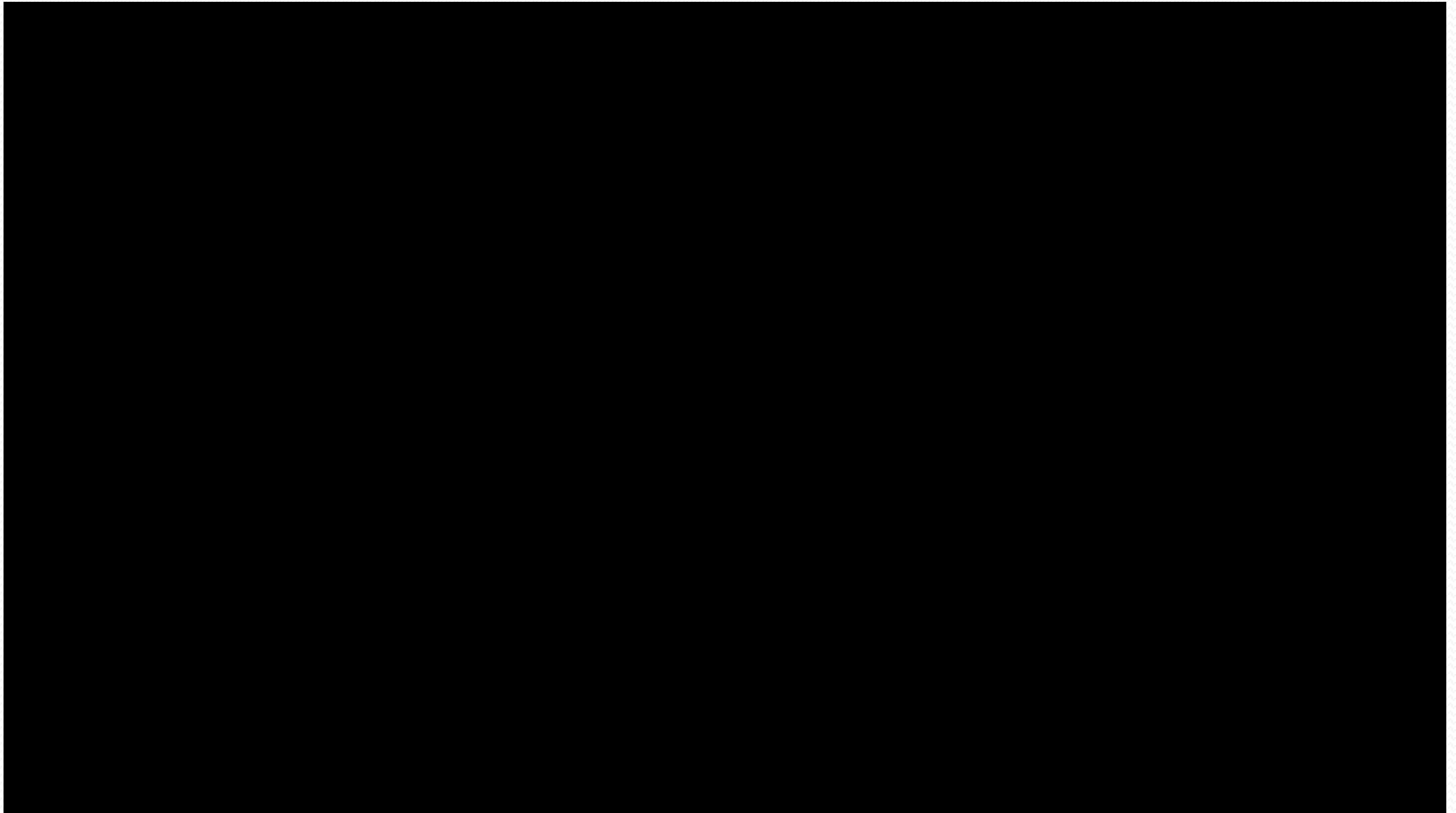
# Organ-on-a-chip



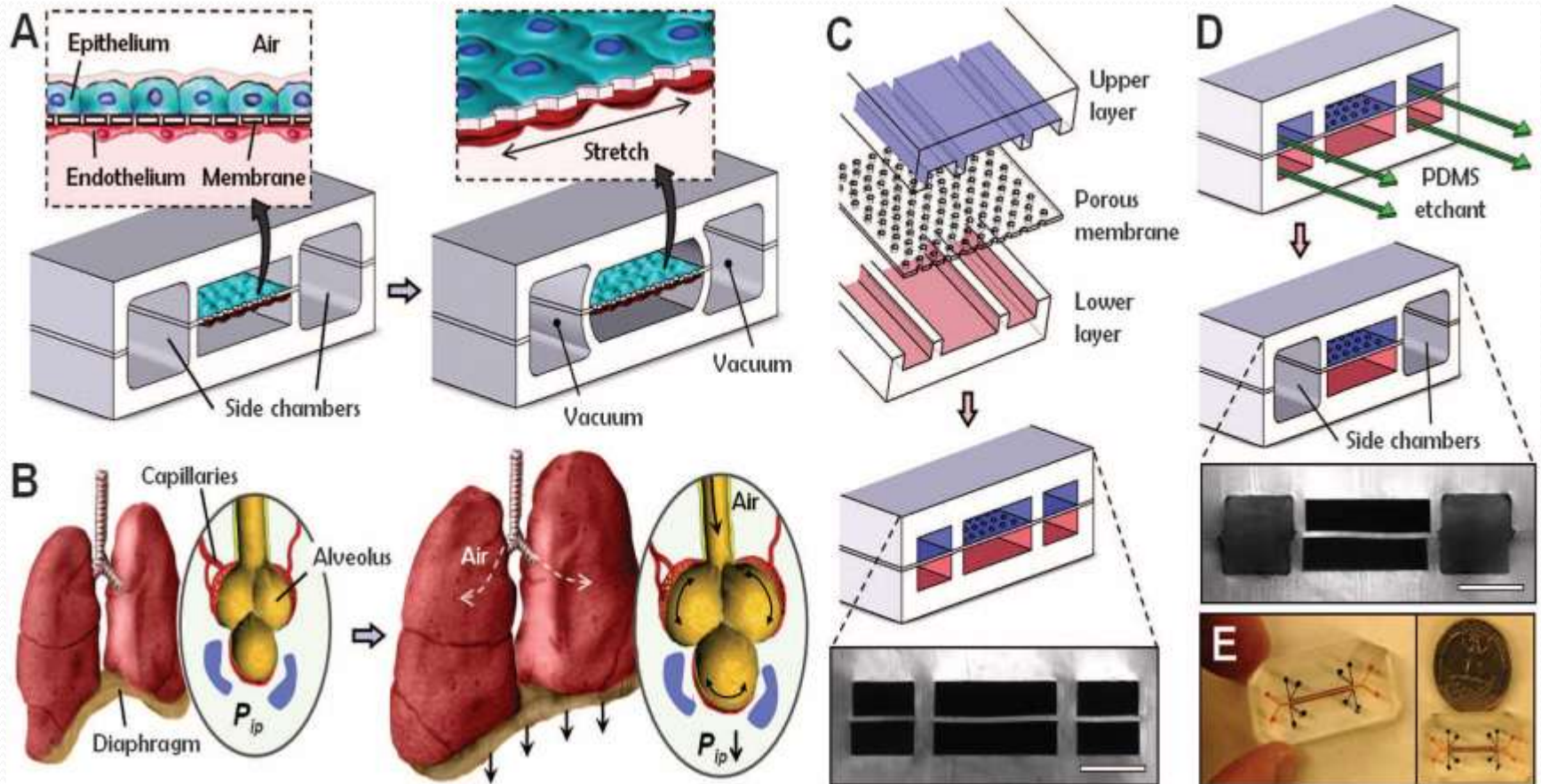
# Technology Now and Future



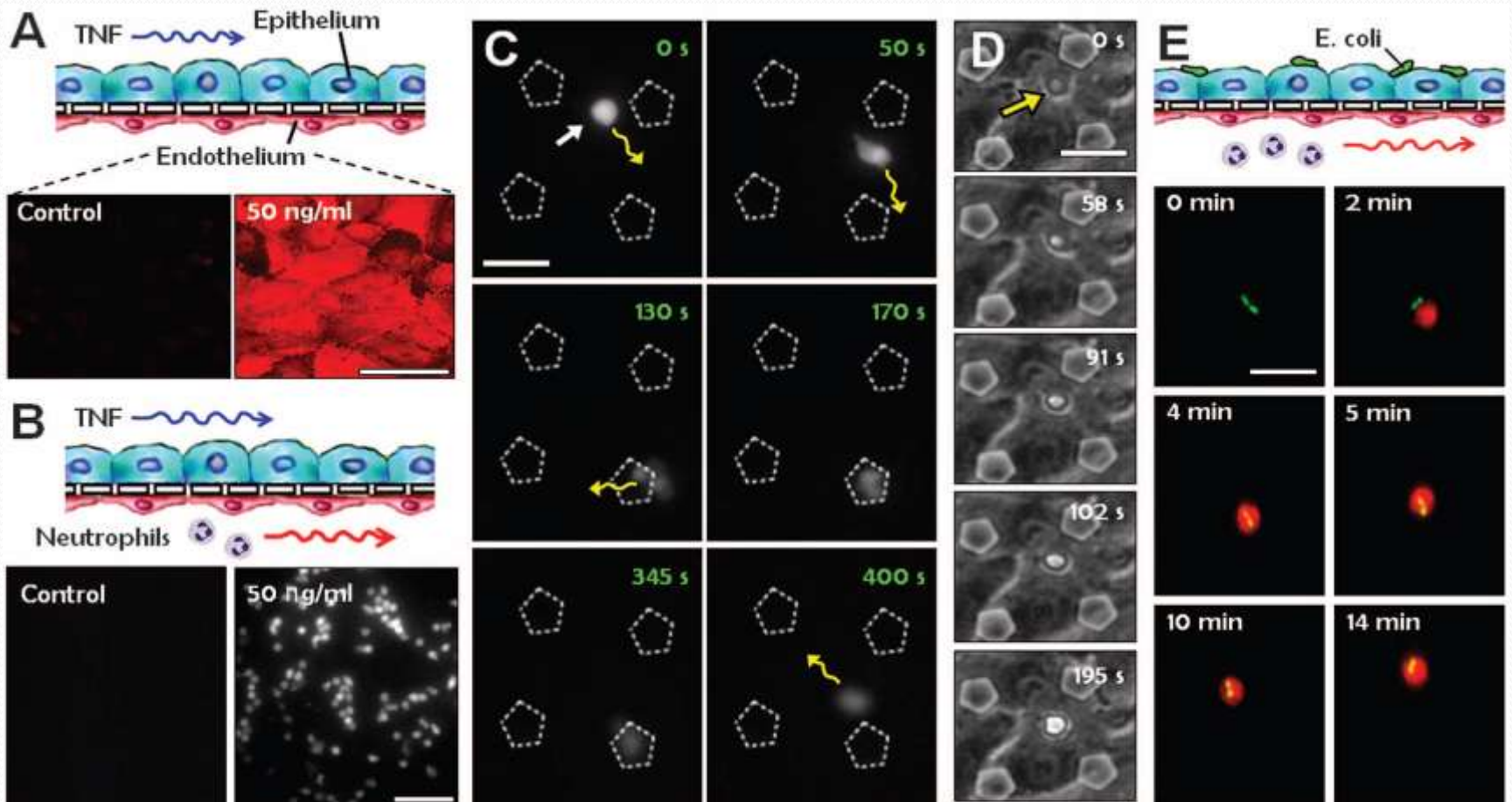
# Lung-on-a-chip(Wyss Institute)



# Brief Introduction



# Brief Introduction



# More Detailed...

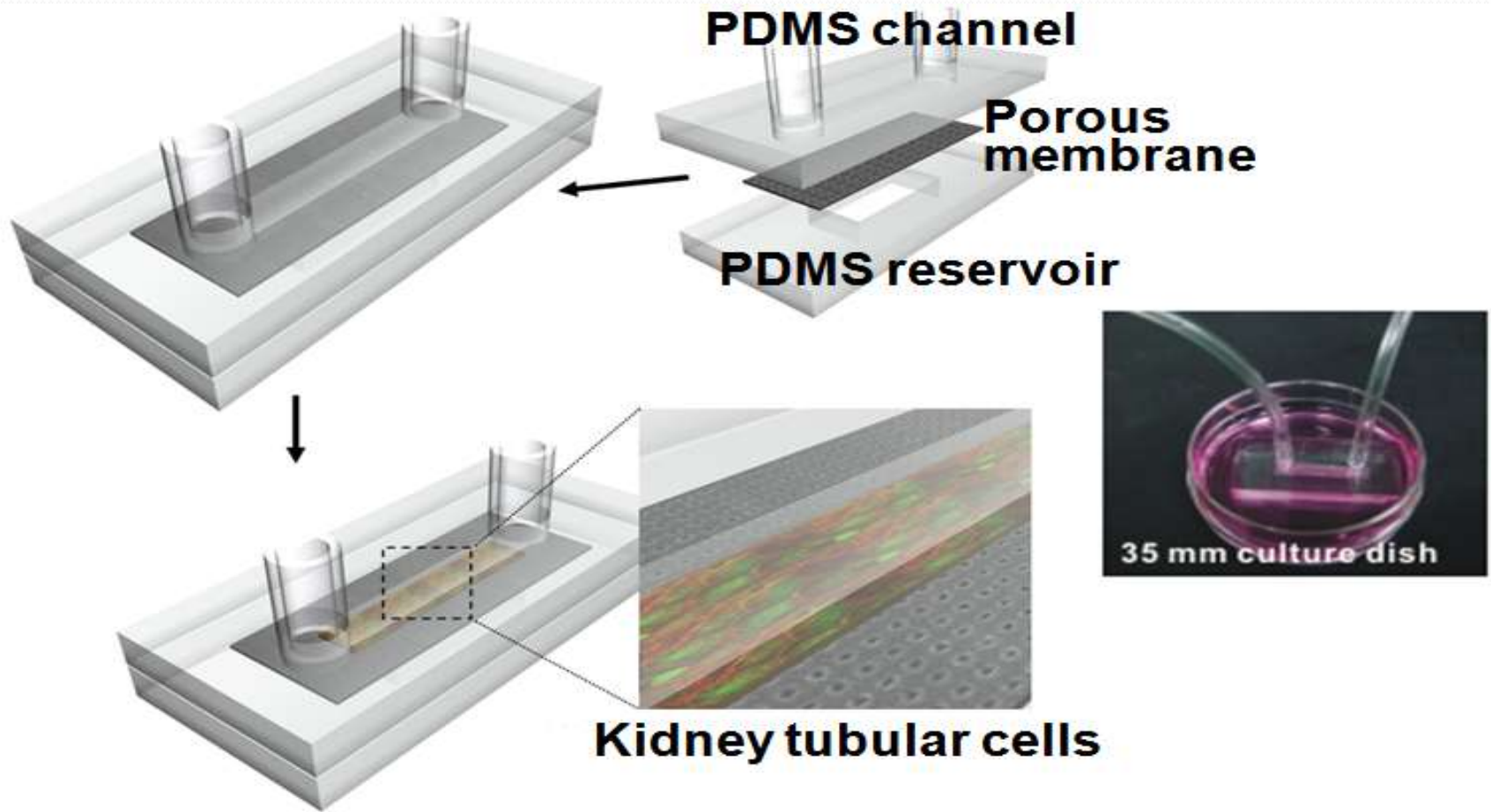
Science journal, “Reconstituting Organ-Level Lung Functions on a Chip,” June 25, 2010

<http://123seminaronly.com/Seminar-Reports/011/33550966-Reconstituting-Organ-Level-Lung-Functions-on-a-Chip.pdf>

# Kidney-on-a-chip(1:05~)

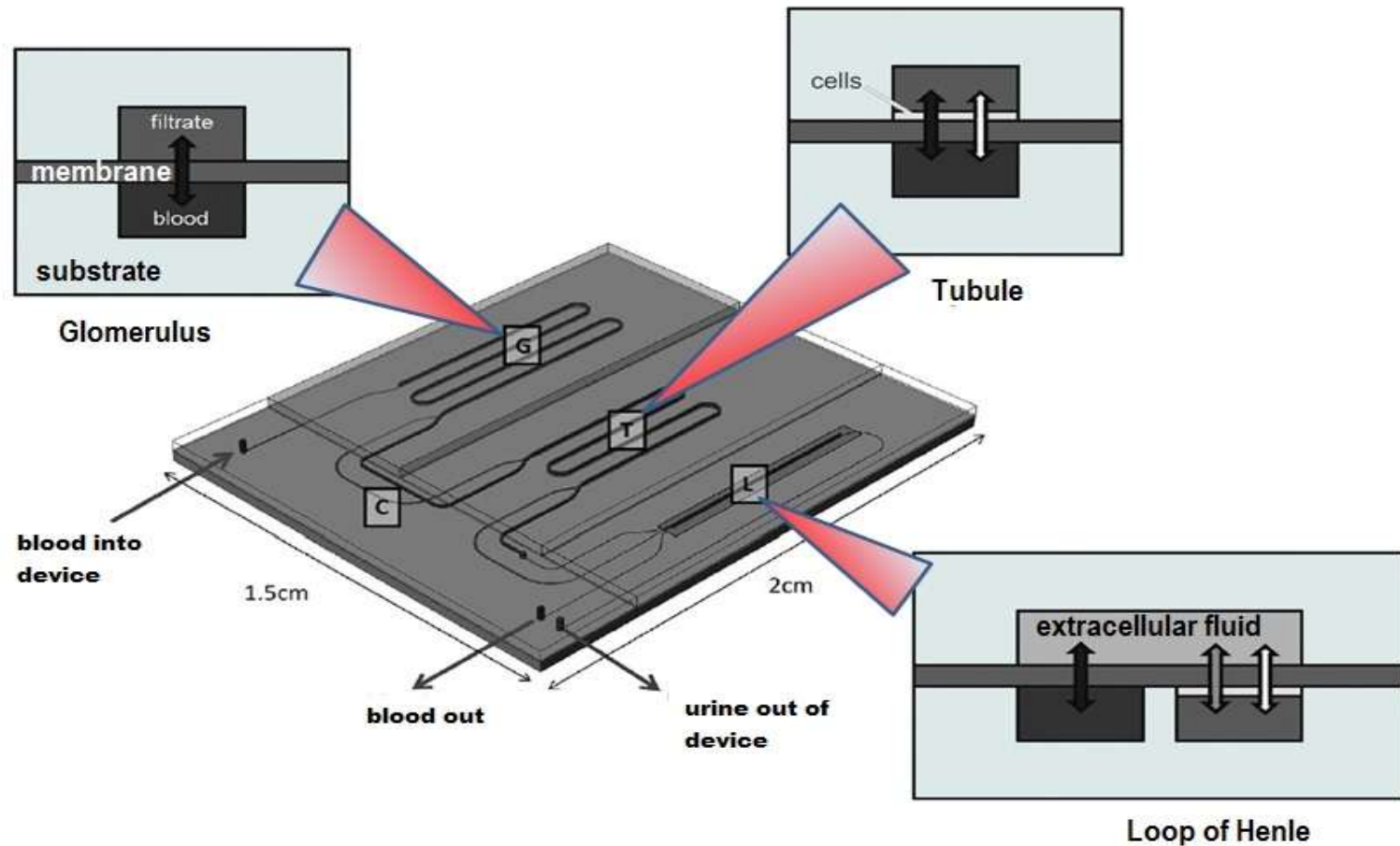


# Brief Introduction





# Brief Introduction



# More Detailed...

15th International Conference on Miniaturized Systems for Chemistry and Life Sciences, “HUMAN KIDNEY PROXIMAL TUBULE-ON-A-CHIP FOR DRUG TRANSPORTER STUDIES AND NEPHROTOXICITY ASSESSMENT,” October 2-6, 2011

[http://www.rsc.org/images/LOC/2011/PDFs/Papers/502\\_o844.pdf](http://www.rsc.org/images/LOC/2011/PDFs/Papers/502_o844.pdf)

# References

- videos:
- 1.[http://www.youtube.com/watch?v=D72\\_ZBqa6tY](http://www.youtube.com/watch?v=D72_ZBqa6tY)
- 2.<http://www.youtube.com/watch?v=52IL9gemyDw>
- 3.<http://www.youtube.com/watch?v=QGPOWTy01KU>

# References

- pictures:
- 1.[http://www.labs.gosh.nhs.uk/media/4596/lab\\_overview.jpg](http://www.labs.gosh.nhs.uk/media/4596/lab_overview.jpg)
- 2.[http://4.bp.blogspot.com/\\_iEH-JqCnlZg/TQNT04edcsI/AAAAAAAAACQ/32bzlr10aUM/s1600/labs-on-a-chips-2.jpg](http://4.bp.blogspot.com/_iEH-JqCnlZg/TQNT04edcsI/AAAAAAAAACQ/32bzlr10aUM/s1600/labs-on-a-chips-2.jpg)
- 3.<http://i.ytimg.com/vi/TFdKuP2NciE/o.jpg>
- 4.<http://www.lcsciences.com/wp-content/uploads/picoarray.png>
- 5.<http://www.intechopen.com/source/html/16832/media/image14.jpg>
- 6.[http://spie.org/Images/Graphics/Newsroom/Imported-2010/003076/003076\\_10\\_fig1.jpg](http://spie.org/Images/Graphics/Newsroom/Imported-2010/003076/003076_10_fig1.jpg)
- 7.<http://ars.els-cdn.com/content/image/1-s2.0-S0956566311007767-gr1.jpg>
- 8.<http://www.extremetech.com/wp-content/uploads/2012/06/self-assembling-copolymer-wires-640x353.jpg>

# References

- 9. <http://www.washington.edu/news/files/2012/07/lung-on-a-chip-5-larger2.jpg>
- 10. <http://seattletimes.com/ABPub/2012/07/24/2018762886.jpg>
- 11. <http://ars.els-cdn.com/content/image/1-s2.0-S0165993602008063-gr4.jpg>
- 12. <http://www.berkeley.edu/news/media/releases/2007/01/images/labonchip.jpg>
- 13. <http://www.rsc.org/ej/LC/2012/c2lc40089h/c2lc40089h-f3.gif>
- 14. [http://upload.wikimedia.org/wikipedia/commons/5/52/Conceptual\\_Schematic\\_of\\_a\\_Human-on-a-Chip.jpg](http://upload.wikimedia.org/wikipedia/commons/5/52/Conceptual_Schematic_of_a_Human-on-a-Chip.jpg)
- 15. [http://upload.wikimedia.org/wikipedia/commons/1/1f/Schematic\\_of\\_a\\_Nephron-on-a-Chip\\_Device\\_with\\_Cross-Sections\\_of\\_3\\_functional\\_units.jpg](http://upload.wikimedia.org/wikipedia/commons/1/1f/Schematic_of_a_Nephron-on-a-Chip_Device_with_Cross-Sections_of_3_functional_units.jpg)
- 16. <http://cdn.medgadget.com/wp-content/uploads/2012/03/chip-organ1.jpg>

# References

- contents:
- 1.<http://en.wikipedia.org/wiki/Lab-on-a-chip>
- 2.<http://en.wikipedia.org/wiki/Organ-on-a-chip>
- 3.[http://en.wikipedia.org/wiki/Lung\\_on\\_a\\_chip](http://en.wikipedia.org/wiki/Lung_on_a_chip)
- 4.<http://123seminaronly.com/Seminar-Reports/011/33550966-Reconstituting-Organ-Level-Lung-Functions-on-a-Chip.pdf>
- 5.<http://www.caister.com/molecular-biology-blog/2009/05/history-of-lab-on-chip-technology.html>
- 6.[http://www.rsc.org/images/LOC/2011/PDFs/Papers/502\\_0844.pdf](http://www.rsc.org/images/LOC/2011/PDFs/Papers/502_0844.pdf)
- 7.<http://www.hesiglobal.org/files/public/Committee%20Presentations/DART/Testicular%20Tox%20Wksp/11-ODowd.pdf>



Q&A

Thanks for your attention!