



Bio MEMS



: Kaist 3D MEMS Team



Micro Bio - System



1)

: ()

2)

: 가 가 , (

polymerase chain reaction)

3)

:

가 MEMS

Lab-On-A-Chip

PCR

microPCR ,

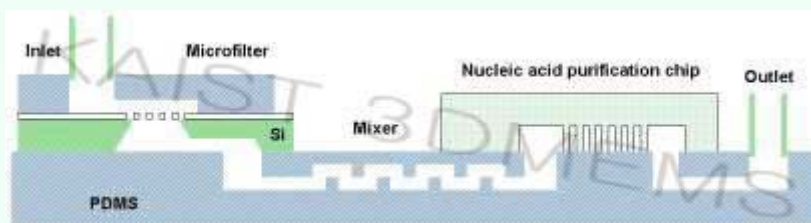
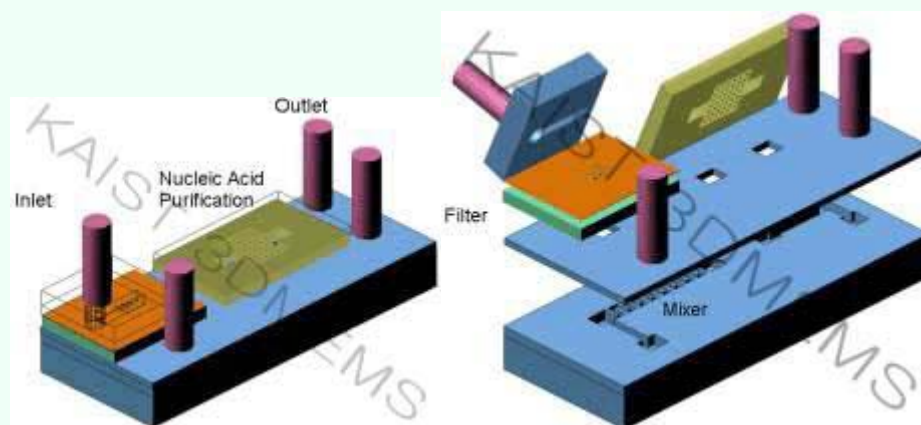
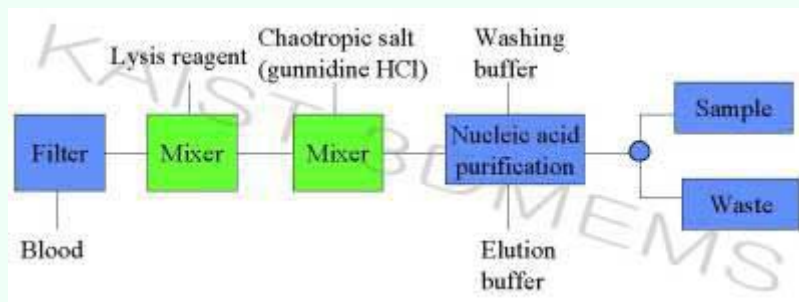
DNA chip,

micro electrophoresis

On-A-Chip

가





(nucleic acid purification) 가

loading

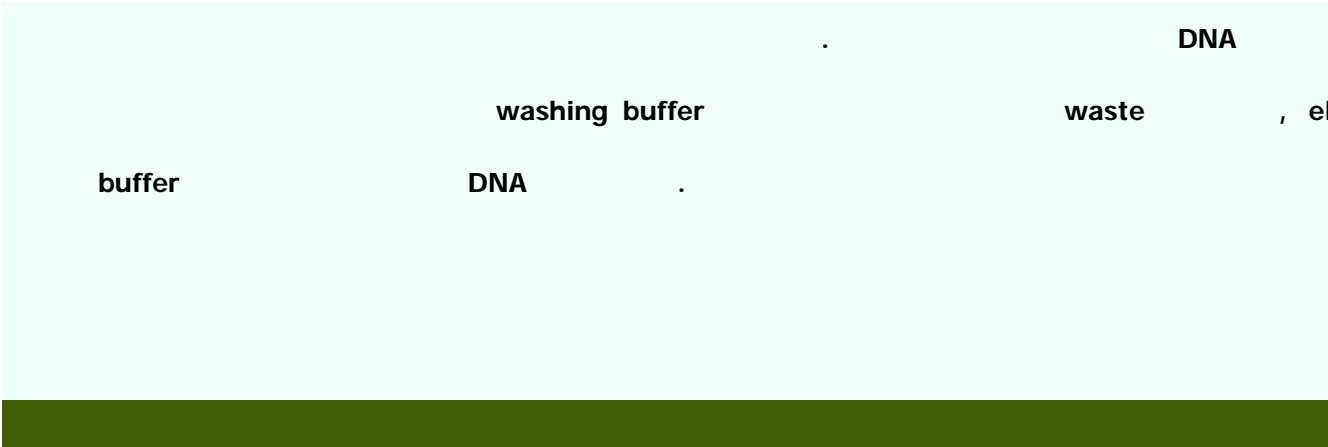
가

lysis reagent

DNA 가

DNA 가

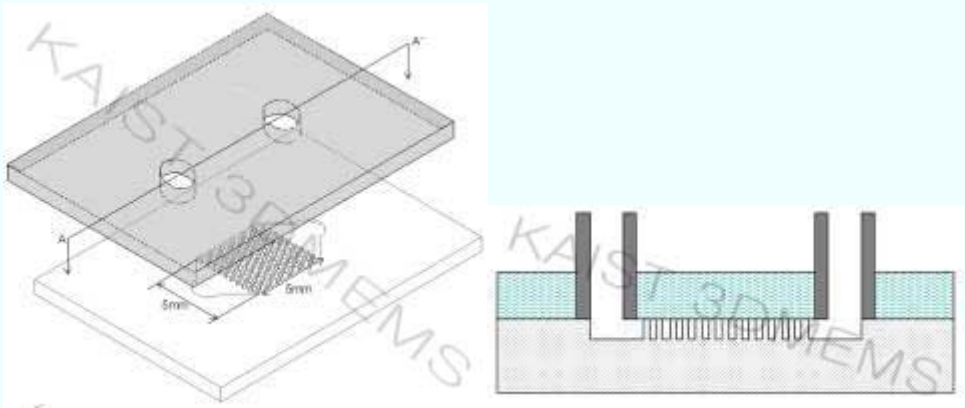
DN



◆ DNA binding chip

■ DNA binding chip

DNA Silicon oxide DNA DNA 가



DNA binding chip

■ DNA binding chip

DNA 가 ,

photosensitive glass

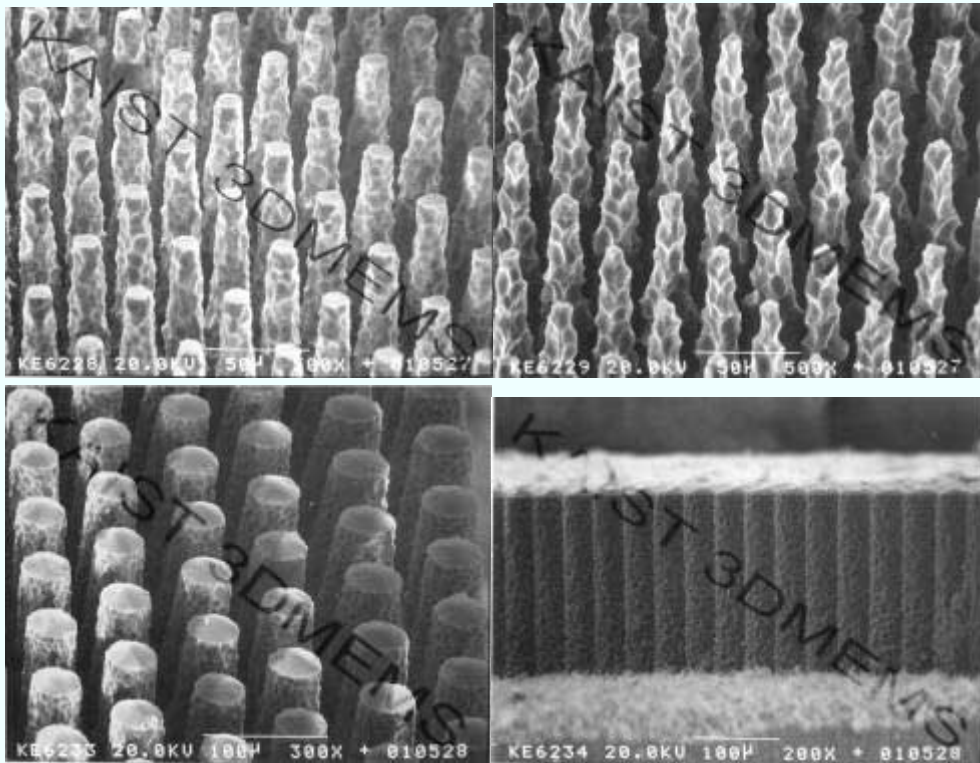
photosensitive glass

, 3

Deep RIE

가

PDMS

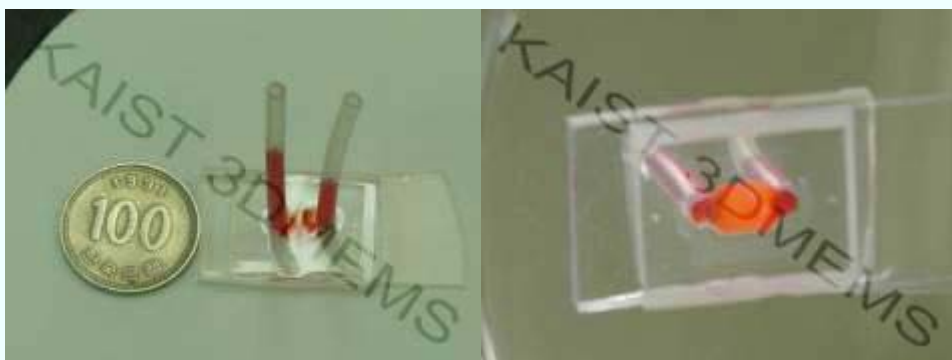


DNA binding chip

DNA 가

photosensitive gl

SEM



DNA binding chip

DNA

DNA gel electrophoresis . DNA
15 ng / μm^2 , 40%



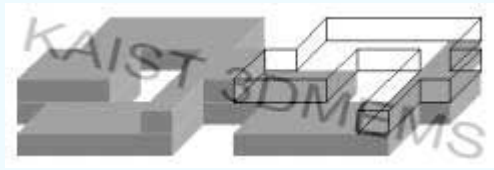
DNA binding chip

DNA

◆ Micromixer

micromixer

PDMS(Polydimethylsiloxane) passive
mixer . PDMS polymer
, 가 , .
micromixer .



micromixer

chaotic advection

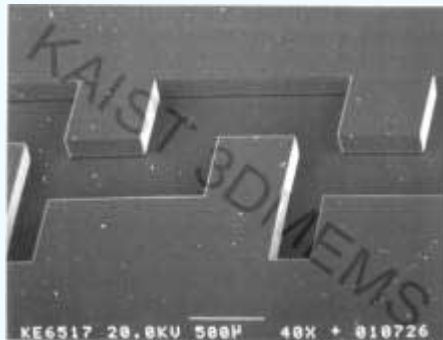
가

 micromixer

PDMS

channel

SEM



PDMS structure

SEM

2

PDMS

3

가

microm

ixer

micromixer



micromixer

mixing test

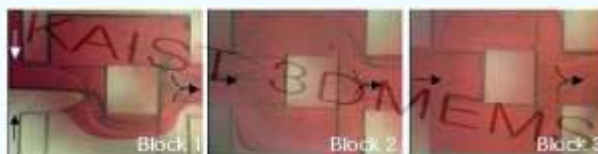
mixing test

0.5, 1, 2mL/min

3 block



(a) 0.5ml/min



(b) 1ml/min



(c) 2ml/min

mixing test



(Continuous Electrowetting)

(continuous Electrowetting)

가 .

.

가 ,

가

,

.

. 1

가

outlet

inlet

가

inlet

.

outlet

가

가

. 2

inlet

inlet

outlet

inlet

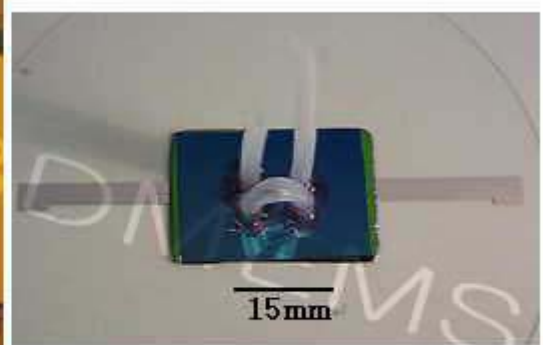
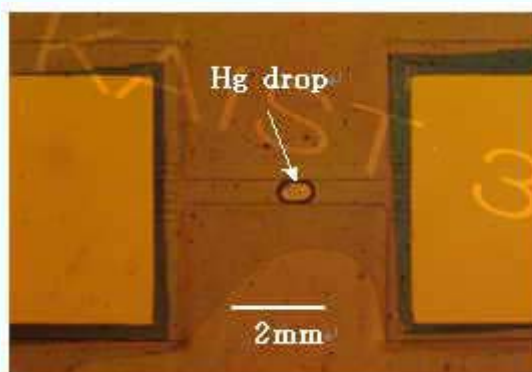
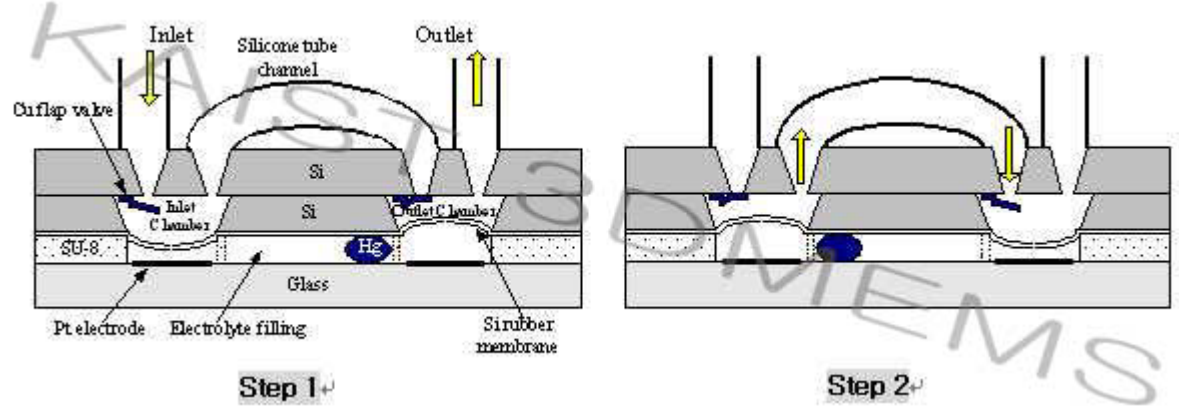
outlet

.

가

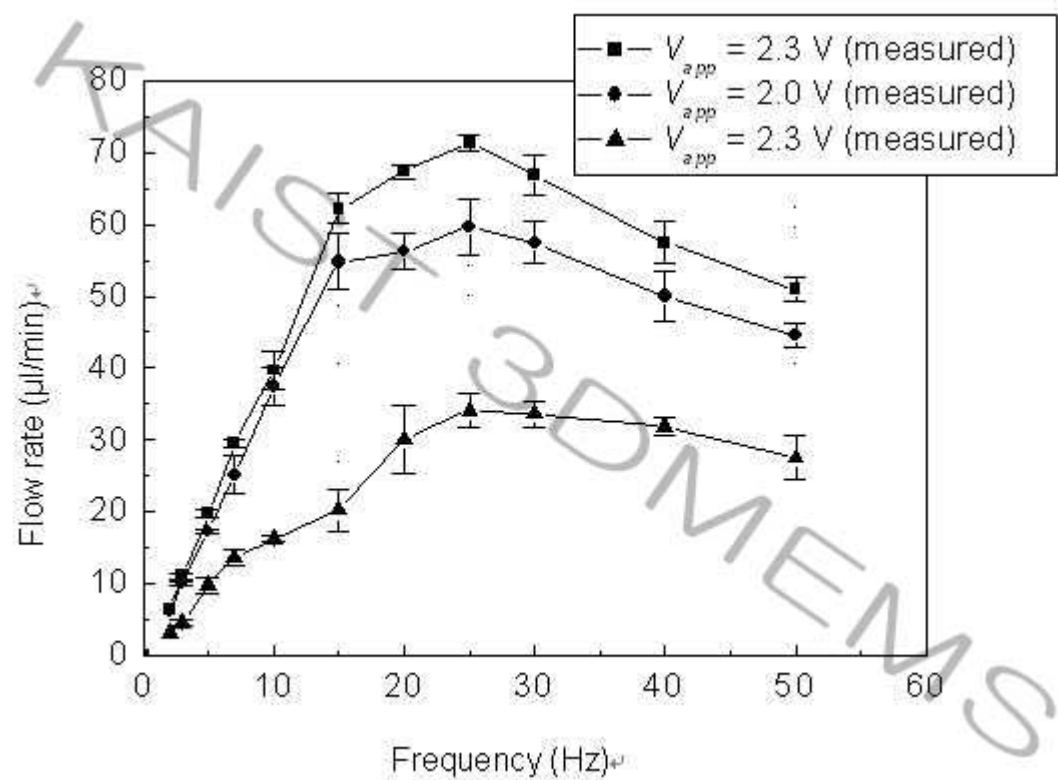
inlet

outlet



25 Hz, ± 2.3 V 가

$\mu\text{l}/\text{min}$.



2.3 V

170 μW

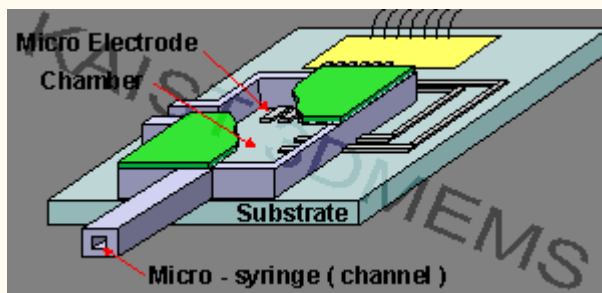


가

100 μ m

가

가



stirring

가

가

2

가

,

stirring

가

가

가

가

가

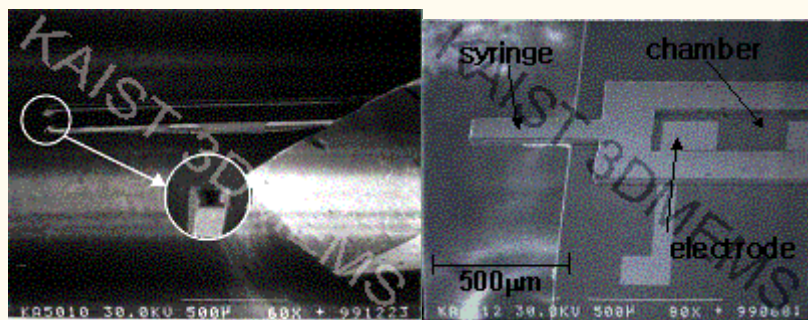
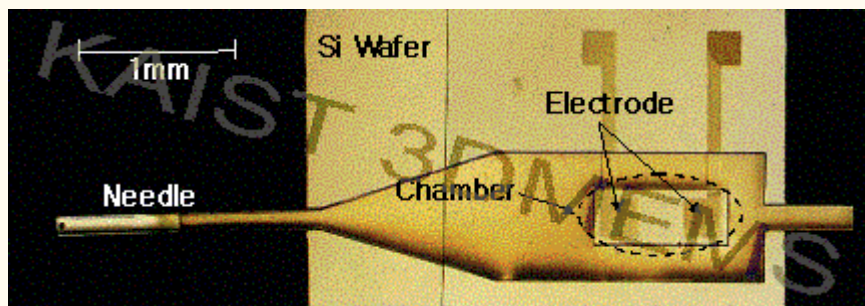
가

가

pyrrole

(electropolymerization)

SEM



4

5µm

20x20

