財團法人國家實驗研究院

國家奈米元件實驗室
微機電服務平台
(光微機電應用尚未有使用者需求)

新竹奈米元件廠 何家驊廠長

NDL目前已經開放奈米機電以及微機電服務平台，目前已經有多個成功案例，唯光微機電技術因目前仍無學界提出需求並進行原型產品之開發，希望有興趣的教授共同參與

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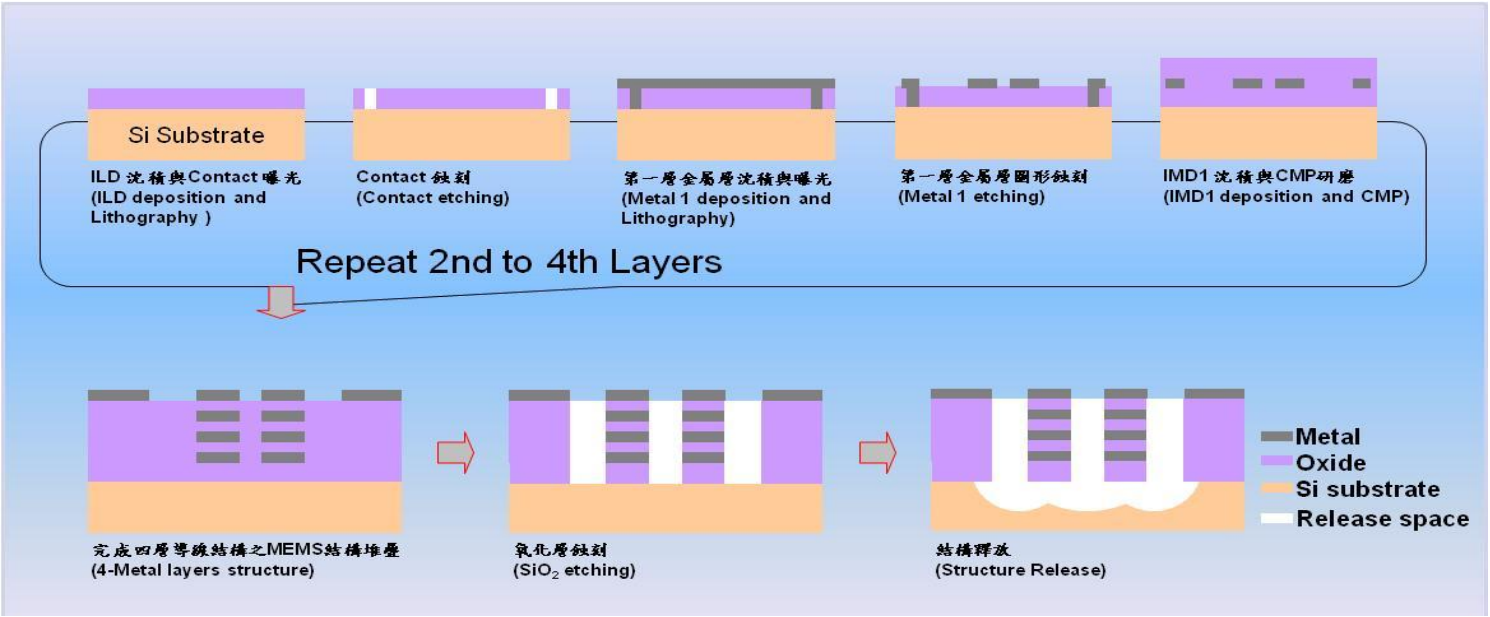
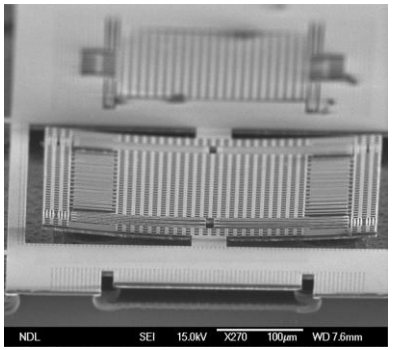
102年4月3日

奈米機電平台技術簡介 (NEMS/MEMS)

- 金屬微加工製程(6吋 and 8吋)
  - 以4層金屬為基礎建置標準MEMS服務平台
  - MEMS: 約100道製程



金屬微加工製程之流程示意圖

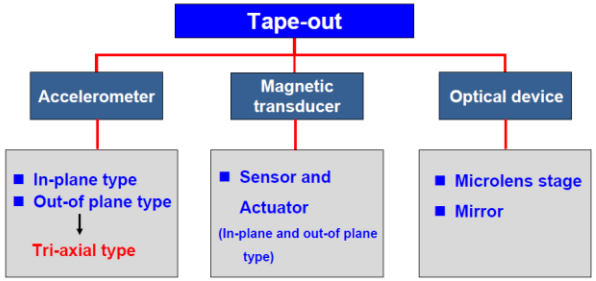


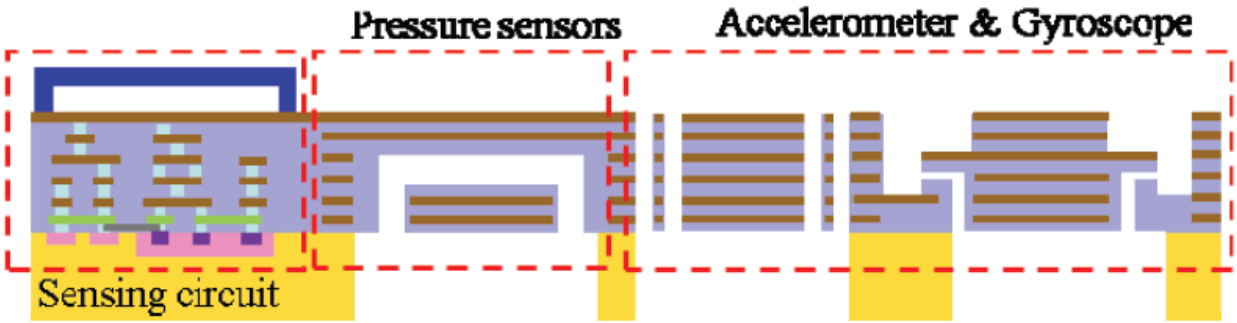
NDL驗證之加速度計

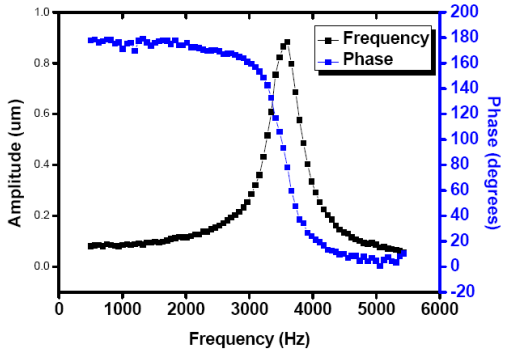
奈米機電平台技術簡介 (NEMS/MEMS)

- 金屬微加工技術平台 + 0.35微米之CMOS
  - 可重量調之質量塊(厚度調整)
  - 可應力調整之製程

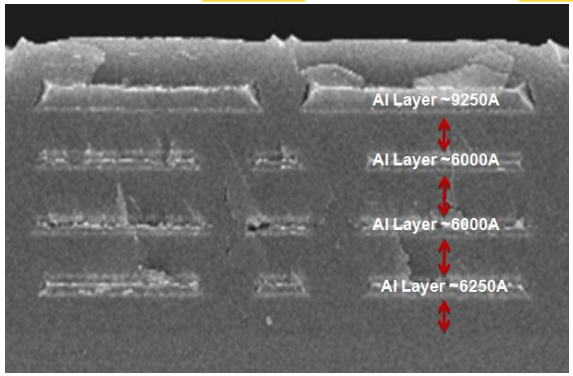
Tape out overview





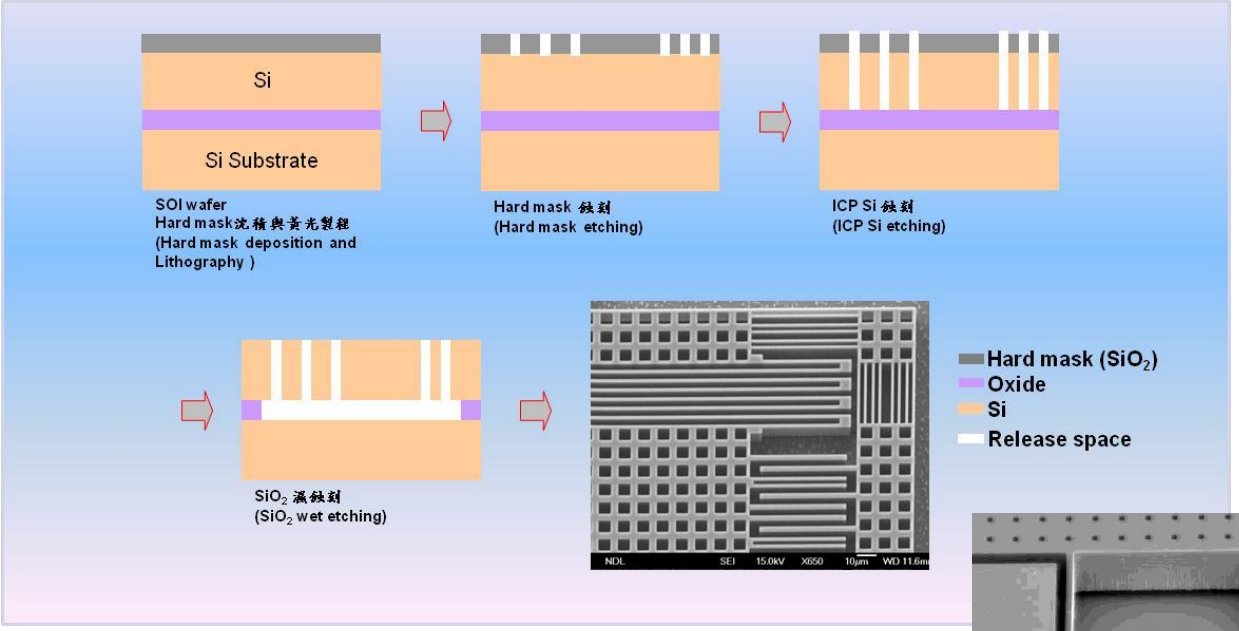


	Sample#1	Sample#2
Proof mass (um²)	1500 x 1000	1500 x 1000
Device layer (um)	25	25
Spring (um)	480 x 5	480 x 10
Finger (um)	200 x 5	200 x 10
Fold	1	1
Frequency		
Design (kHz)	3.98	5.29
Measurement (kHz)	3.60	5.00

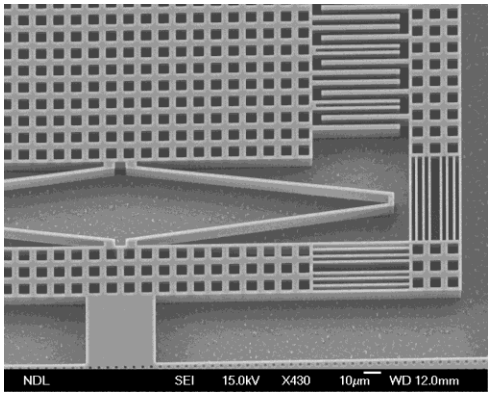


奈米機電平台技術簡介 (NEMS/MEMS)

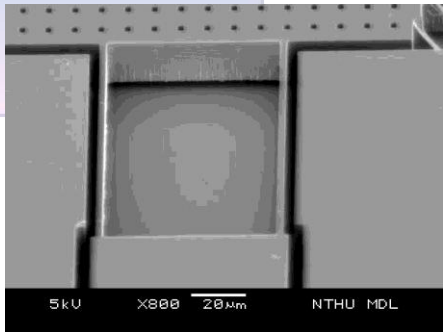
- SOI微加工製程(6吋)
  - 以SOI晶圓為基礎建置標準MEMS服務平台
  - MEMS: 約8道製程



SOI微加工製程之流程示意圖

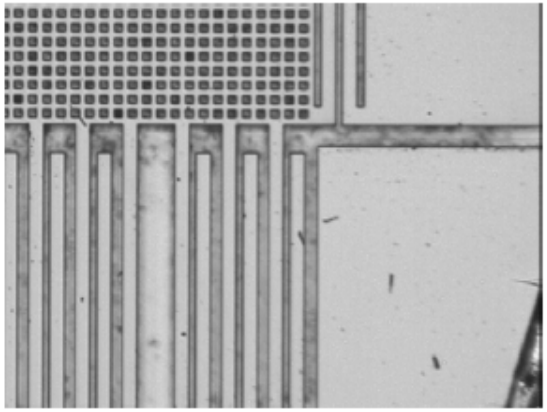


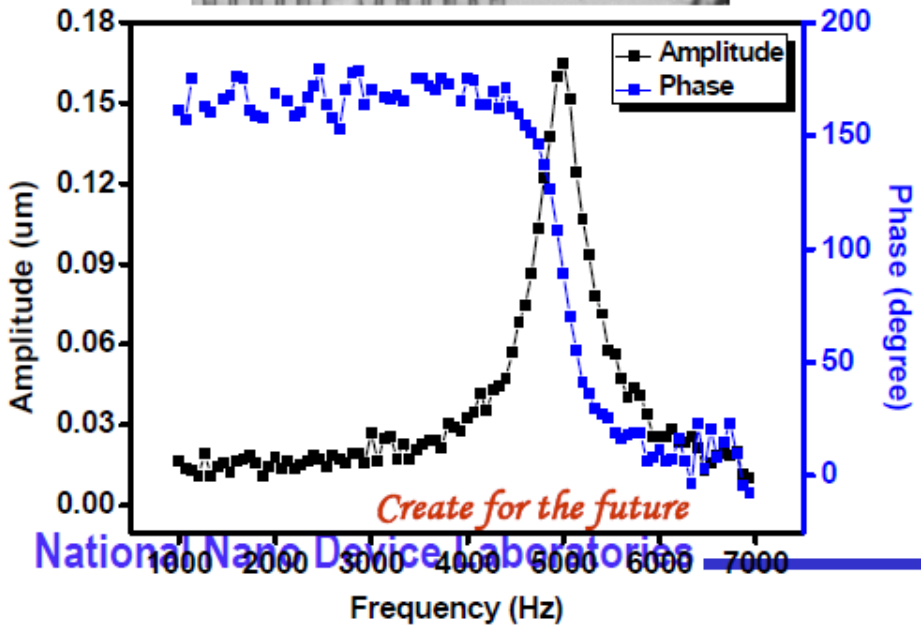
NDL驗證之加速度計



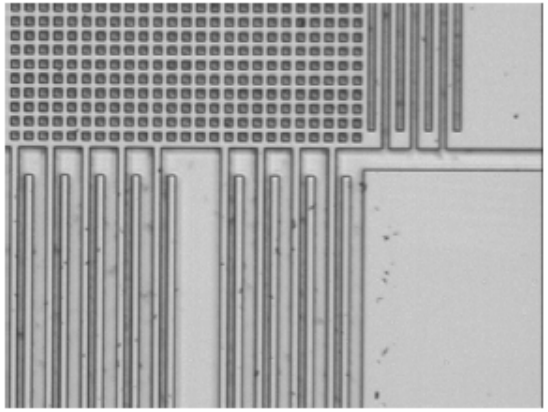
奈米機電平台技術：懸浮結構驗證

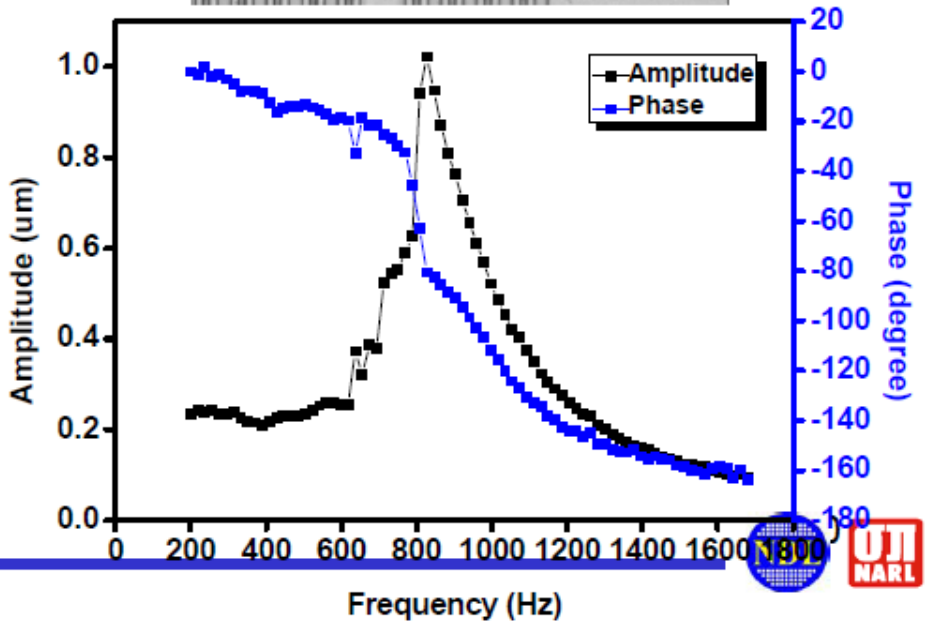
- Driving voltage 30V
- Range 1~7 kHz
- Natural frequency 5.00 kHz





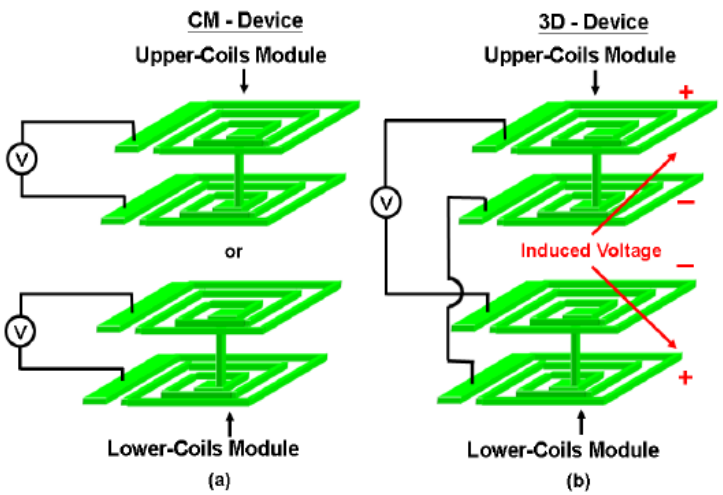
- Driving voltage 10V
- Range 0.2~1.7 kHz
- Natural frequency 827 Hz

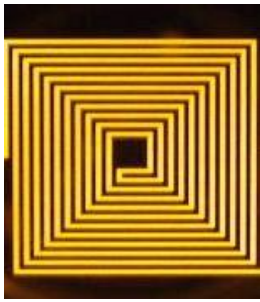


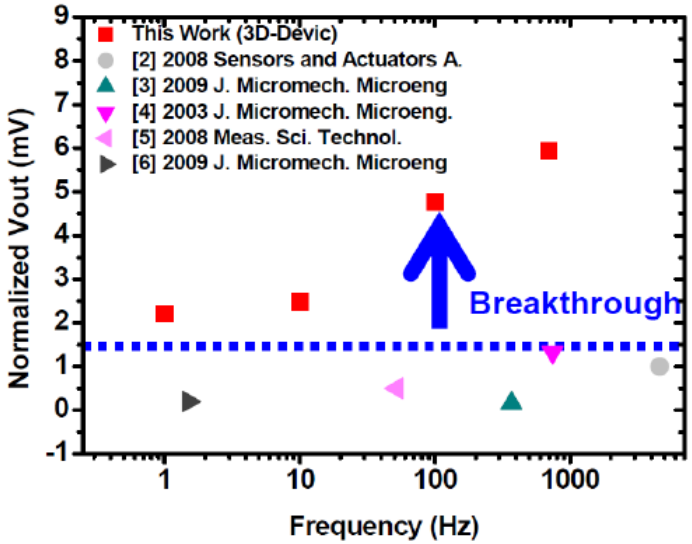


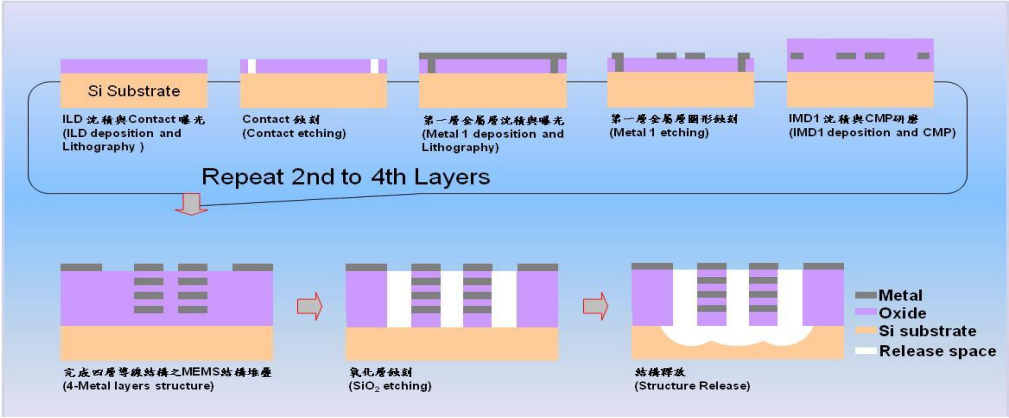
奈米機電平台技術應用之一：橋梁低頻振動感測器

- 利用懸浮金屬之振動以切割磁力線
  - 成功在極低頻(河流沖刷頻率)展現輸出電壓



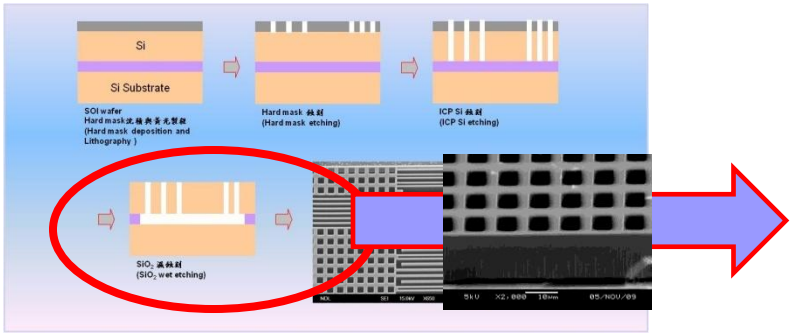


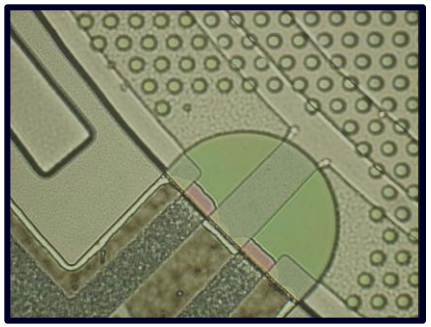


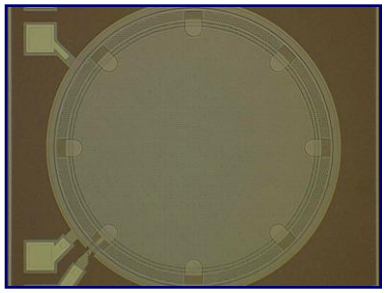


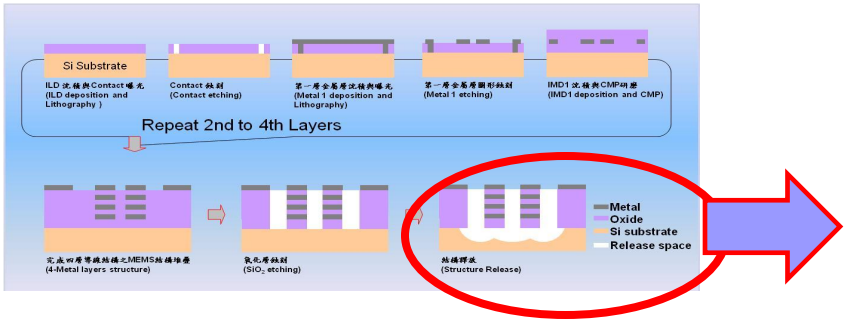
奈米機電平台技術應用之二：微機電麥克風之開發

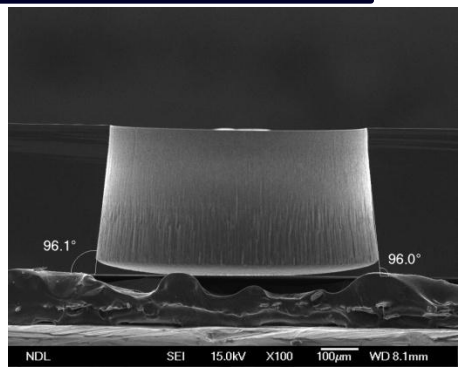
- 上懸浮：利用SOI微加工製程之release
- 下懸浮：利用金屬微加工製程之ICP
- 振膜與導線：利用金屬微加工製程之1P2M

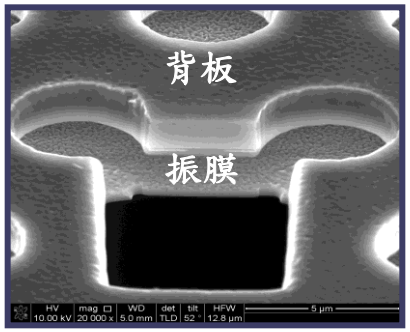
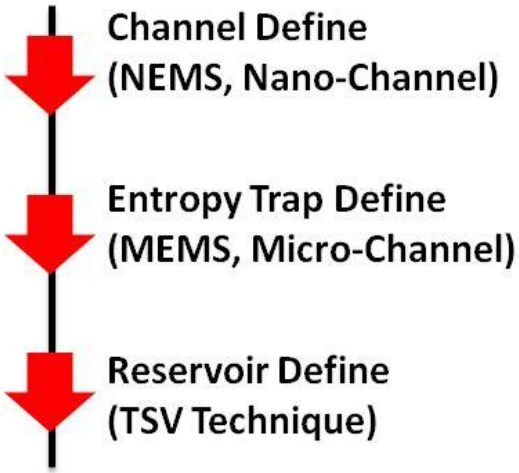
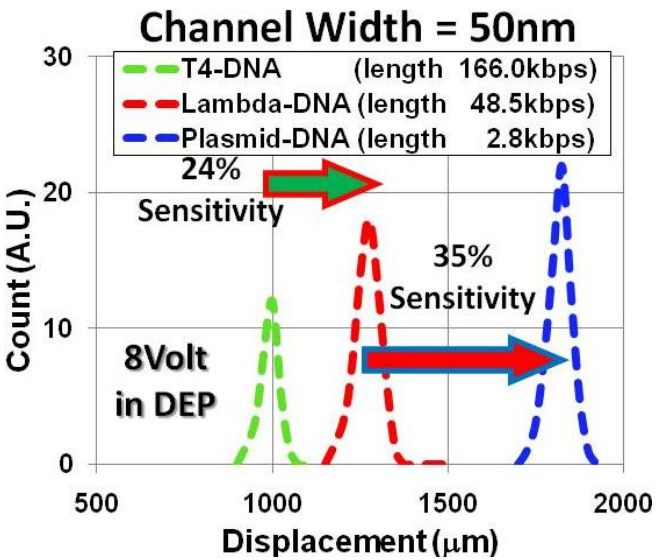
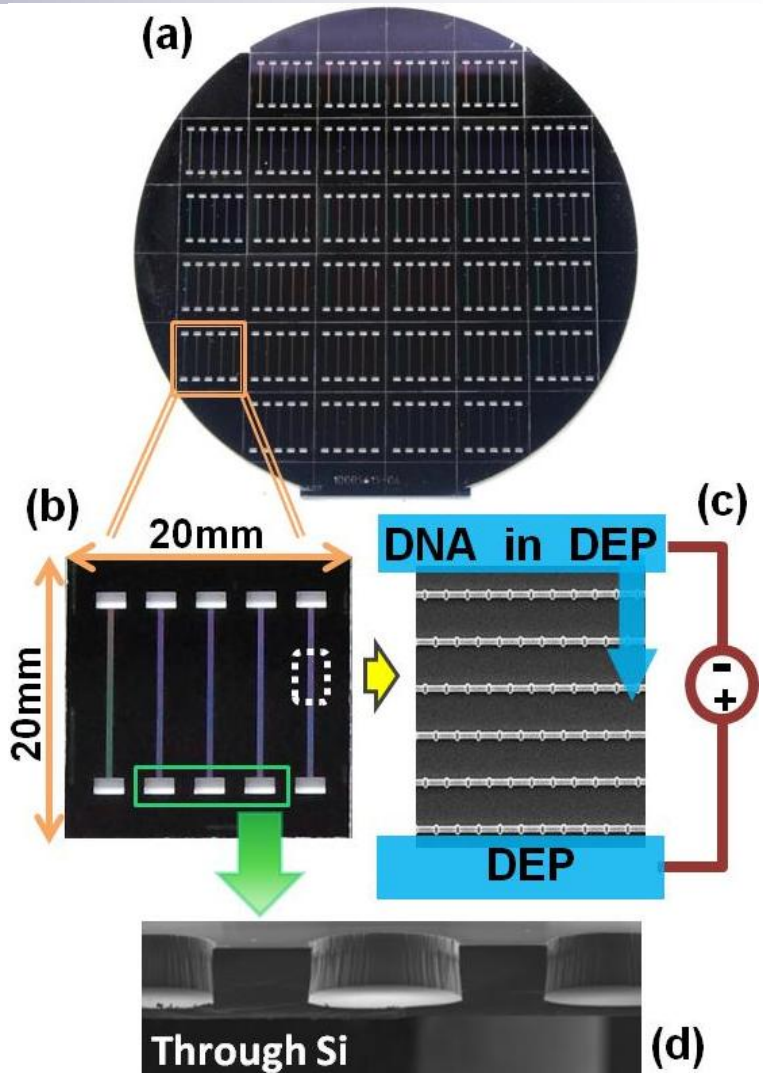












奈米機電平台技術應用之三：DNA介電泳奈米流道之開發