



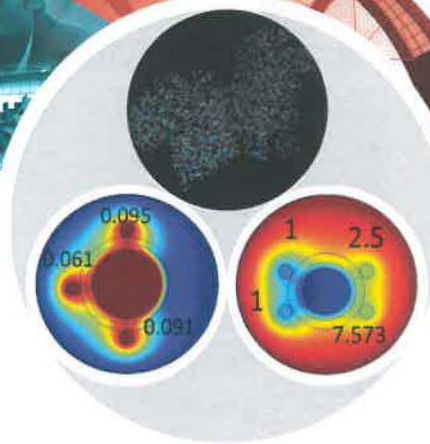
**INVENTORS**

DR. VOON CHUN HONG  
 PROF. UDA BIN HASHIM  
 TIJJANI ADAM  
 MOHAMMAD WESAM

**CONTACT DETAILS**

Institute of Nano Electronic Engineering (INEE)  
 Universiti Malaysia Perlis  
 Tel : +604 979 8680 / 8561  
 e-mail : ude@uamap.edu.my

**LAB-ON-A-CHIP DEVICES FOR POINT-OF-CARE IN-VITRO DIAGNOSIS: INDUCED PARTIAL CHARGE CALCULATION AND SSDNA HYBRIDIZATION IN NANOWIRE ACTIVE DOMAIN VIA MD AND COMSOL MULTI-PHYSICS**



**ADVANTAGES**

- **SMALL FOOTPRINT SYSTEM**  
 Inexpensive, hygienic, and portable; bringing quality diagnostics to remote communities.
- **DIGITAL INTEGRATION**  
 Tests are analyzed quickly and accurately, and patients are connected with doctors and health organizations.

**NOVELTIES**

- High selectivity
- High sensitivity
- Small size
- Label free
- Sample concentration as low as Single DNA

**SPECIFICATION**

Nanowire width	30 ± 3 nm & 20 ± 3
Nanowire thickness	40 ± 5 nm
Number of wires on chip	4 x 24
Nanowire length	L=1000 microns
Nanowire area width	W=3000 microns
Materials	Single crystalline silicon
Materials on request	Single crystalline silicon Most of metals and some alloys Semiconductor metal oxides: ZnO, SnO2 Single and multi-magnetic layers: NiFe, Co...
Electrode materials	300 nm Pt & Au
Electrode size	3.5 x 1 mm
Substrate material	Insulator of 800 nm SiO2 on <100> silicon
Substrate material on request	Silicon, Glass, Quartz, some plastics
Chip sizes	A=5 x B=5 x H=0.55 mm

**DESIGN, SIMULATION & RESULT**

Shows two of ssDNA hybridization using MD

2D-Silicon NWS Design

2D-Simulation result of partial charge silicon NWS

Showing the result analysis of the relationship between Electrical resistivity and current

**PRODUCT COMPARISON BETWEEN OURS & OTHERS**

Item	the Little Things Factory	ThinXES Microtechnology AG	Ours
Price	RM1000	RM800	RM200
Environmental Friendly	NO	NO	YES
Quality	NO	NO	YES
Modification	NO	NO	YES
Reusability	NO	NO	YES
Technique used	Costly	Costly	Cheaper

**COMMERCIAL POTENTIAL**

Organic and Inorganic Interaction

The Product

AFM image of Si-nm

Surface modification

Calculated partial charge

N	N	PARTIAL CHARGE	Wire size
-0.16	0.84	1	>200nm
-0.5	0.5	1	200nm
-0.046	0.05	0.095	150nm
-0.45	-0.55	1	200
-0.011	0.5	0.061	50nm
-7.572	0.001	7.573	500nm
-0.5	1.8	2.3	250nm
-0.061	1.5	2.48	300nm
-0.061	0.030	0.091	150nm
-0.046	0.054	0.1	180nm

**APPLICATIONS**

- Biological biosensors is for diagnostic
- Cancer
  - E-call
  - Stress (stress detection)

**COLLABORATORS**

- INSTITUT PENYELIDIKAN DAN KEMAJUAN PERTANIAN MALAYSIA (MARDI)
- Standards and Industrial Research Institute of Malaysia (SIRIM)
- SITERRA Sitterra Malaysia Sdn.Bhd