Open Innovation in Nanotechnology Development and Commercialization

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25th July 2014
Overview of MIMOS

Vision
To be a Premier Applied Research Center in Frontier Technologies

Mission
To pioneer innovative information & communication technologies towards growing globally competitive indigenous industries
**Partnering for Economic Growth**

“Economic growth is based on advances in productivity, and productivity is based on discovery and innovation”

Professor Jeremy Siegel, Wharton. The Shape of Things to Come, *Newsweek*, April 8, 2010

**New Innovations:**
- Business Models
- Services
- Products
- Technologies
How To Collaborate?

Open Innovation Platform to accelerate industry growth

Market Identified
Country's strategic market positioning and niches
Market to be Identified

Open Innovation Platform

10 - 15 years
3 - 5 years

MARKET-DRIVEN INNOVATION

TECHNOLOGY-DRIVEN INNOVATION

Acquisition Risk Capital

Take to market

RESEARCH GRANT
TECHNOLOGY GRANT
RISK CAPITAL

Income growth and jobs
Value added products and services

3 - 5 years
OIP Value Proposition:
As Enabler to Nanotechnology Development

- **Industry:**
  - able to create & innovate many products

- **Researchers:**
  - able to enhance with local technologies

- **Research Institute**
  - able to create & evolve new OIPs

- **Open Standards and Architecture**
  - able to interoperate with other systems

- **Open Frameworks**
  - able to integrate with multiple OIPs

- **Innovation Ecosystem:**
  - Strengthen the R-D-C value chain
  - Accelerate innovation (ideas to market)
MIMOS Open Innovation Platform (OIP)

The Concept

- **Open Innovation**: adding value to the existing solutions
- **Open Platform**: standard/common platform which help speed up productization

![Diagram showing Platform, Product/application, and Total Solutions with value multipliers]

- **Value = 1X**
- **Value = 10X**
- **Value = 100X**

MIMOS Open Innovation Platform: drive **INNOVATION** on **common platforms**
MIMOS Nano-Sensor Development Through OPEN INNOVATION PLATFORM

Endless Possibility of Sensors Innovation
MIMOS Nano-Sensor Development
OIP System And Framework

1. Management System & GUI
2. Communication System and Interface
3. Sensor Node & Platforms
4. Sensing Materials
5. Multi-Variate Sensors

MIMOS OIP Solution

Sensor 1  Sensor 2  Sensor 3  Sensor 4  Sensor 5  Sensor 6  Sensor 7
MIMOS Nano-Sensor Development
Case Study: Application in Agriculture Solution

1. Green-House Management System
2. Communication System and Interface
3. Sensor Node & Platforms
4. Sensing Materials
5. MIMOS Agriculture Sensors

MIMOS OIP Solution

Sensing Materials

- pH
- EC
- N
- P
- K
- NH4+
- Humidity
Success Stories:
1. High Value Crops in Greenhouses

Venue: Greenhouse No 2, MARDI Serdang | Crops: Tomato

- sensors
- management
- control
- fertilizer dosing
- fertigation
- cooling
Success Stories:
1. High Value Crops in Greenhouses

- Moisture Sensor
- Temp & Humidity Sensor
- EC & pH Sensors
- Wired Sensor Network (Daisy Chain)
Success Stories:
1. High Value Crops in Greenhouses

- Irrigation Piping
- Fertilizers Tanks & Dispenser
- Mixing Tank
- Solenoid & Discharge Valves
- Control Panel
Success Stories:
1. High Value Crops in Greenhouses

Greenhouse Management System

- Multiple GH monitoring
- Data logging, event, graph, alarm
- Recipe, single line diagram
Success Stories:
2. Palm Oil Controlled Pollination

Remote Monitoring
Wireless System
Accurate Triggering
Designed for Outdoor
Success Stories:

3. Open Field Aquaculture
Success Stories:
4. Open Sea Aquaculture

Aquagrow Corporation
... building a World Class, fully integrated marine finfish aquaculture operations
MIMOS Sensor Technologies
Award and Recognition

Industry Innovation and Advancement (Precision Agriculture)
R&D Organization of the year

Type of Sensors
- Temperature
- Electrical Conductivity (EC)
- Soil Moisture
- Acidity (pH)
- Nitrate (N)
- Phosphate (P)
- Potassium (K)
- Relative Humidity
- Dissolved Oxygen (DO)
- Dissolved Ammonium (NH3)
- Glucose
- Gas
- Breath Humidity
- Pressure
- Bacteria

- Multi sensing with wireless capability
- Robust and durable
- User Friendly

NANOELECTRONICS
MEMS / NEMS

N,B,K and Temperature Sensors, Reference electrode

Humidity and Temperature Sensors

Alkalinity pH and Temperature Sensors

Moisture and Temperature Sensors

MIMOS Integrated Sensor
MIMOS Shared Services Facilities
As Key Enabler to Open Innovation

WAFER FAB – MICRO AND NANO FABRICATION

FAILURE ANALYSIS & WAFER LEVEL TESTING LABS

RELIABILITY TESTING LAB & TRAINING ROOMS
MIMOS Shared Services Facilities: Material and Failure Analysis Lab