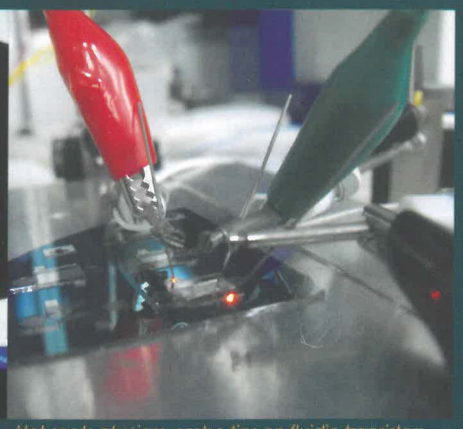
Multi-angle polisher / grinder

Optical fringe face detection



Hot-spots at micro-probe tips on fluidic transistors

To Infinity and Beyond...

School of Microelectronic Engineeing (SoME) R&D

SoME was ond of the two pioneer schools set up in UniMAP. SoME, and hence UniMAP, hold the distinction as the only public, tertiary education institution that has in its arsenal, for both teaching and research purposes, a full-fledged and operational semiconductor microfabrication plant. The facility is also endearingly known as the 'Cleanroom'. This multi-million ringgit facility was set-up to primarily aid in teaching the course of microelectronics. Microelectronic engineering concerns all the technologies and techniques in the produce and fabrication of semiconductor wafer devices. This facility has also become a centre for research activities, as have the other two courses. In addition to Microelectronic engineering, SoME also offers Electronic engineering which is focused towards design of microelectronic circuits and Photonics engineering which encompasses all aspects related to light. Hence, the research focus of SoME has been based on the choice available courses since the academia are based on these three course divisions. Expertise in these three areas are in various subcategories with as diverse a training ground that literally spans the globe.

In the courses themselves, Microelectronic and Electronic engineering are pioneer initiatives and as such have a strong as well as a varied built-up base of research amenities. Microelectronic engineering focuses on semiconductor wafer processing, which is done in the 'Cleanroom'. This facility boasts equipment such as Inductively Coupled Plasma-Reactive Ion Etching (ICP-RIE), Plasma Enhanced Chemical Vapour Deposition (PECVD) that are not only standard semiconductor process capable but also nano-technology certified. Besides these, there are a host of other standard microelectronic process-capable equipment. Accordingly research in this sub-category in SoME can be classified to semiconductor materials, devices and diagnostics as well as Micro-Electro Mechanical Systems (MEMS) devices, structures and designs.

Electronic engineering in SoME is focused to microelectonic designing whereby a suite of design softwares are readily available for the design of integrated circuits (IC), large scale integration (LSI), and application specific integrated circuits (ASIC). Additionally full custom and semi custom IC design for digital, analogue and mixed-signals systems as well as FPGA design applications and system on chip design are part of the research roadmap. Photonics, the newest course, is also the latest research direction that has been undertaken in SoME. Equipment for this field is still being acquired, however, there are initiatives into photocells, organic light emitting diodes (OLEDs), pyroelectric sensors, cell propagation, optofluidics and others. Currently these initiatives are based on the semiconductor processing capabilities of the 'Cleanroom'. Design of optical devices and systems which include optical communications systems is in place and is being actively researched.

It is clear that the current research roadmap of SoME consists of two major routes, which are i) fabrication, and ii) design. Going by current global practices, design is the way forward. One the other hand dwindling numbers of fabrication facilities and consolidation of others might make a fabrication facility or 'wafer fab' lucrative in the future. In order to stay ahead, as a knowledge and research centre, SoME continually updates staff technical skill by providing for trainings and brief attachments. As a way forward, however, a Research Blueprint 1 (RB1) has been adopted with the following objectives:

- establish research groups within SoME
- ciltivate an effective and efficient research culture
- enhancing research skills among SoME staff
- fostering collaboration between researchers in SoME

The RB1 has been implemented at stage 1 where research groups or clusters have been established in order to incorporate all research activities currently being carried out in SoME. The established groups are:

- Light reseARch GrOup (LARGO)
- Micro-Electro Mechanical Systems (MEMS)
- IC Design
- IC Fabrication
- Instrumentation

As for stage 2 implementation, local colloquia have been organized and has seen notable speakers sharing their experience and expertise. Among the prominent ones are:

Prof. Takhir Razykov
Solar Electricity : Current Status and Future Prospects (USA and EU Strategic Energy Programs until 2050)

Prof. Syahmi Ahmad
Nano Electro Mechanical Systems (NEMS)

Prof. Jugdutt Singh
Professional Development Course : Radio Frequency and Low Power CMOS Design

Towards achieving the third stage goals, internal research exhibitions have been organized to showcase the latests in research ouput from staff as well as to motivate others to join the established groups. The first exhibition, SOMEX 1, which picked winning entries based on commercialization potential, scientific innovation and value, and presentation. The winners would represent SoME in higher level exhibitions. SOMEX 1's stringent evaluation saw 5 silver medalists:

1) *Temperature Effect of BST Thin-films* - Ms. Nur Syakimah Ismail
2) *From Polystrene to Lymphoblastoma* - Dr. Mukhzeer Mohamad Shahimin
3) *K-Means Clustering Algorithm Using PERL Scripts* - Mr. Ahmad Husni Mohd Shapri
4) *MEMS Bimetallic Structure for IR Sensor* - Mr. Mohd. Hafiz Ismail
5) *Photonic Shift Register* - Dr. Mohamad Halim Abd. Wahid

An interesting twist to SOMEX that sets it apart from other UniMAP exhibitions is that there is a monetary, albeit minimal, gain. A Gold medallist is awarded a certificate and RM 750.00. Likewise Silver and Bronze medallists are awarded a certificate and a cash prize of RM 500.00 and RM 300.00, respectively. In order to further enhance research at SoME, many academic staff have been sent abroad to further their education. Needless to say that their areas of expertise is within the tri-field perimeters. It s hoped that their home coming will boost SoME's publication output and propel SoME as the leading research institution in UniMAP.