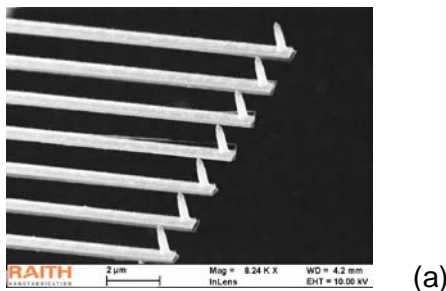
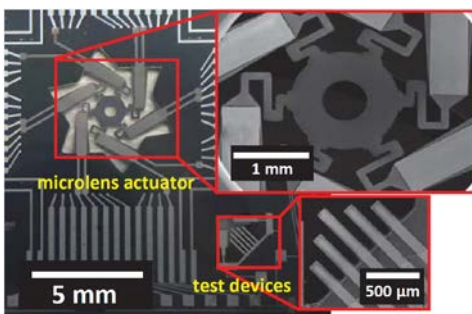


Design, fabrication, and measurement of nano and micro scale systems with mechanical, electrical, and/or optical functionalities on a silicon substrate or integrated circuits (CMOS) to enable development of novel and advanced sensors and actuators.



(a)



(b)

(a) *Sharp nanotips on nano-cantilever*  
(b) *Micro-actuator released on silicon chip*

## More information

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# Nano/Micro optical, electrical, and mechanical systems on silicon chip/Integrated circuits

MEMS and NEMS Group/Electrical Engineer and Telecommunication/Faculty of Engineering

## Competitive Advantage

- A number of technologies, which are not available elsewhere, are developed for **the first time**. The technologies are being protected by patents or IP is being filed. The technologies include
- **High aspect ratio sharp nanotips**: CMOS compatible and integration with nano-scale devices at unprecedented density, which is not possible with any other technology anywhere else.
- **PZT microlens micro-actuators**: Record breaking large displacement and resonance frequency, and small footprint micro-lens piezoelectric actuator for micro-optics application are developed.
- **Low thermal budget polysilicon films**: Thick and low stress silicon film with low thermal budget suitable for MEMS formation on top of CMOS is possible only with this technology. Record breaking high gauge factor piezo-resistive polysilicon at low thermal budget is obtained recently from these films.

## Recent research projects

- **High speed parallel AFM on a single chip** – aims at developing the smallest and fastest AFM system.
- **Piezoelectric micro-actuators** – aims at enhancing the performances (auto-focus and optical zooming) of micro-optic devices through advanced micro-actuators.
- **Low thermal budget polysilicon films**- aims at enabling electrical, optical and mechanical systems on top of CMOS process.

## Successful applications

- Research publications around the technologies are available demonstrating the capability of the technology. They can be provided upon request.

## Facilities and infrastructure

- Access to the state-of-the art advanced semiconductor manufacturing tools in ANFF at UNSW and other nodes around Australia.
- Access to the state-of-the art Mark Wainwright analytical centre for process monitoring, diagnostic and film characterisation.
- MEMS measurement lab equipped with Polytech MSA-500 with the capability of measuring dynamics of nano/micro structures with sub-nm displacement resolution.
- Silicon photonics characterization optical bench set-up with automatic nano-positioners, deterministic polarization controller, and 7.5GHz spectrum

## Our experts

- Dr. Aron Michael
- Prof Chee Yee Kwok