# Microwave Photonic Multiparameter Sensing

[2022-007]

Electronics and Semi-conductors

## Opportunity

The combination of optical microresonators and the emerging microwave photonic (MWP) sensing has recently drawn great attention. The inherent multi-parameter sensing potential of this fusion, predominantly reliant on the adoption of multiple resonance modes, has surfaced as a notable advancement. Leveraging the integration of deep learning (DL) into MWP sensing, we introduce a novel sensing paradigm.

## Technology

Presenting a **Microwave Photonic Multiparameter Sensing** paradigm that offers high-resolution and ultra-sensitive sensing capabilities, along with a broad measurement range. This cutting-edge technology facilitates the detection of small changes in both amplitude and phase of microwave photonic signals, enabling real-time high-performance measurement using two-dimensional information (amplitude and phase).

The essence of this innovation lies in the transformation of spectral responses from singular optical resonances to microwave signal zero-transmission profiles, effectuating heightened interrogation precision devoid of resonance parameter limitations.

## Competitive Advantages

- **Elevated Resolution and Sensitivity**: Emanating high-resolution and ultra-sensitive sensing capabilities.
- **Broadened Measurement Spectrum**: Surpassing the confines of traditional microwave photonic methods.
- **Simultaneous Multi-Sensor Interrogation**: concurrently assess the reactions of multiple sensors.
- **Lightweight and Cost-Efficient**: Enveloped in a lightweight and cost-effective design.
- **Scalability**: with the prospect of mass production.

## Commercial Applicability

This on-chip real-time versatile sensing system can be applied in the material characterisation and sensing filed, catering to both in-situ and off-line measurement scenarios:

- Thin film characterisation;
- Blood test;
- Biomolecules detection;
- Nanoparticles sensing;
- Electric vehicle battery monitoring.

## Inventors

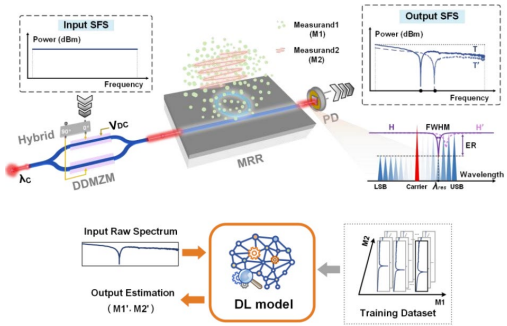
Prof. Xiaoke Yi, Dr Xiaoyi Tian

## Intellectual Property Status

This IP protected by an Australian Provisional Patent Application.

## Technology Development

Currently positioned at **Technology Readiness Level (TRL) 3**, the innovation has successfully culminated in a validated working prototype.





**Contact us**

**Mark Berlage**
Commercial Theme Leader
mark.berlage@sydney.edu.au
+61 2 8627 4681

Commercialisation Office, Research Portfolio
The University of Sydney
**sydney.edu.au/cdip**