Microwave Photonic Multiparameter Sensing

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Electronics and semiconductors

> TRL 3-4

Problem

The combination of optical micro resonators 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, a novel sensing system is introduced.

Solution

The new Microwave Photonic Multiparameter Sensing system 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.

Intellectual Property Status

This IP is wholly Sydney-owned and is protected by PCT application No. PCT/AU2023/051164.

Potential Commercial Applications

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.

Competitive advantages include:

- Elevated resolution and sensitivity: high-resolution and ultra-sensitive sensing capabilities.
- Broadened measurement spectrum: surpassing the limits of traditional microwave photonic methods.
- Simultaneous multi-sensor interrogation: concurrently assessing the reactions of multiple sensors.
- Lightweight and cost-efficient: contained within a lightweight and cost-effective design.
- Scalability: designed with ease of mass production

Inventors

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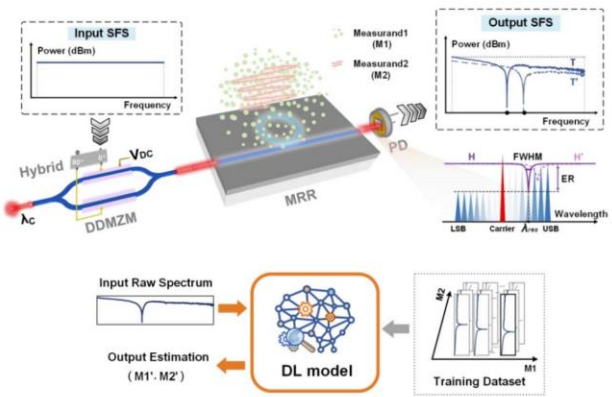

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