Winter 2025

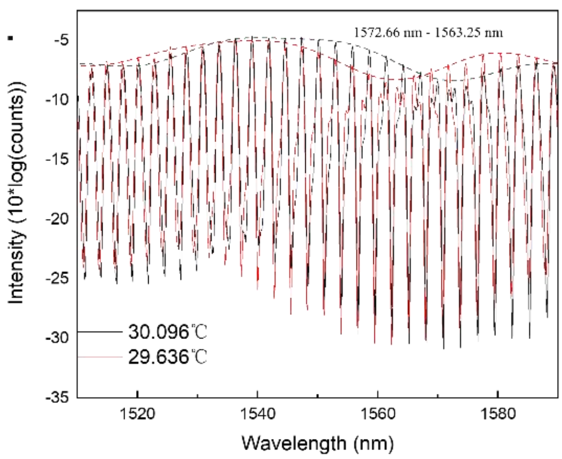
Optics & Photonics Group Lunchtime Seminar Series

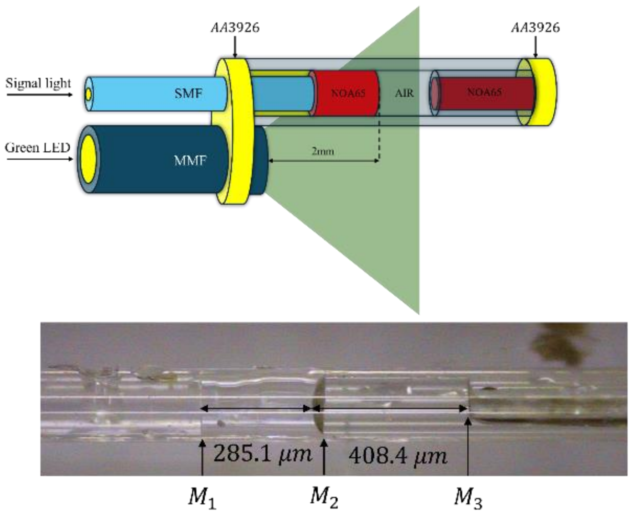
University of Nottingham

Thermal blood flowmeter based on cascaded Fabry-Pérot Interferometers

Ruirong Gong

OPG UoN





12:00 Wed 26 Feb 2025

Pope – C14

OPTICS & PHOTONICS
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Ruirong Gong

Thermal blood flowmeter based on cascaded Fabry- Pérot Interferometers

Accurate blood flow measurement is crucial in various clinical scenarios for diagnosing and treating vascular conditions. An innovative thermal blood flowmeter that utilizes two cascaded Fabry-Pérot Interferometers (CFPIs) in a multimode fibre (MMF) is presented. The MMF is connected to a green LED for modulating fluid temperature, and the resulting temperature change is inversely proportional to the flow rate. The CFPI consists of a polymer and an air cavity of lengths 285.1 μm and 408.4 μm, respectively. The CFPI temperature sensitivity is enhanced due to the high thermo-expansion of the polymer compared to silica fibre. The typical discrete FPI system based on the Vernier effect comprises one sensing cavity and a reference cavity of constant length. In contrast, the CFPI is more compact and further enhances the sensor's sensitivity because the lengths of the two cavities change in opposite directions. The CFPI's temperature sensitivity is improved 117 times compared to a single polymer cavity and can reach 26.67$\pm$1.07 nm/°C. Flow in a phantom system can be measured over a range from 20 ml/min to 300 ml/min.

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All are welcome

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