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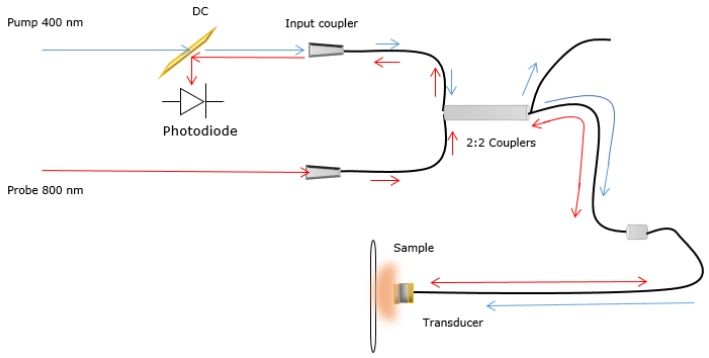
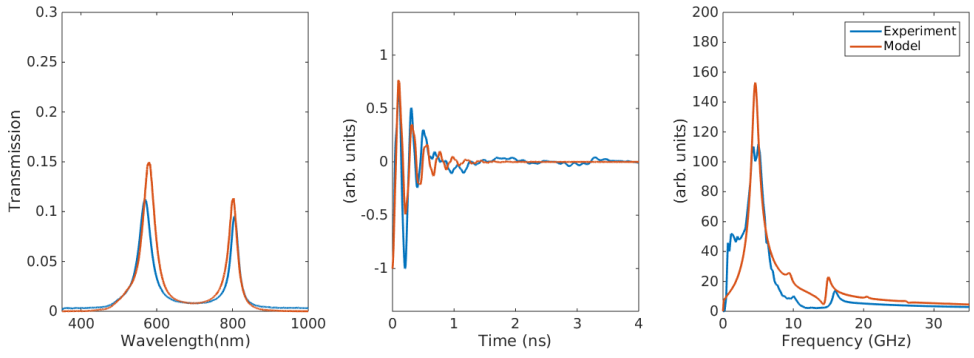
Optics and Photonics Group Lunchtime Seminar

"Needle sized laser ultrasonic diagnostic device"

Mitra Soorani





Abstract

12:00pm Thursday 1st December 2016
Lecture Theatre 203 Tower Building
All Welcome

http://optics.nottingham.ac.uk/wiki/Talks_2016

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Designing extremely small sized transducers can be very important both in medical and industrial applications to extract information that is hard to access externally. Optical transducers are considered as an alternative to piezoelectric transducers due to their small size and high sensitivity. The aim of the current work is to develop tuneable transducers at the tip of single mode optical fibres that can be used to generate and detect ultrasound. The small size of the fibres allows the transducers to be deployed via needles or catheters for biomedical applications.

The transducer presented in this study is comprised of a multilayer structure of partially reflecting layers around an optically transparent filling, similar to a Fabry-Perot interferometer . The layer structure, layer thickness, materials and the two wavelengths determine the optimum design of the transducers. Different techniques are used to deposit the layers: direct sputter coater, dip coating and spin coating. The fabricated transducers are characterized using optical spectroscopy. A pump-probe fibre based laser ultrasound instrument is used for generation and detection of ultrasound.

We are presenting preliminary results of generation and detection of ultrasound in both transmission and reflection modes. The ultrasound waves are produced in different frequency regions from hundreds of MHz to tens of GHz. We will also discuss the challenges and potential solutions for the future development of these novel fibre optic ultrasonics transducers that we model the effect of them.