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Optoelectronic Research

School of Computing & Digital Media

Research in optoelectronics was established in 1987, and was the first in a UK institution to undertake and pioneer research on **Plastic Optical Fibre** (POF), which has been presented at numerous international POF conferences (UK, USA, France, Germany, Japan, China, Brazil, Greece, Portugal). Activities in POF have also included tutorials and one-day short courses on POF Data Communications and POF Sensors.

Optoelectronics Laboratory can support postgraduate research and undergraduate final year projects as well as consultancy and industrial research contracts. These specialist facilities have also been offered to visiting European researchers and other UK university collaborators.

Research in POF has evolved in the areas of **illumination** (solar capture and daylighting), **data communications** (bandwidth optimization, splitters, couplers), and **sensors** (passive and dynamic displacements).

Solar Capture, Daylighting & Decorative Illumination

POF is used for both solar capture and transmission of light for daylighting without any additional optics or electronics. Sunlight is captured by the structurally modified surface of the POF which is also used as the tracking mechanism for the sun's movement.

Current research focuses on the use of Polymethyl Methacrylate (PMMA) POF in both solid and hollow tube forms for solar capture and sunlight transmission.

Large core diameter PMMA POF is also being used in tailor-made consultancy projects for decorative illumination.

Data Communications

Improvements in the performance of high numerical aperture POF have been achieved through various mode scrambling / filtering techniques. These 'small size' moulded scarmblers achieve bandwidth optimization, improve the reliability and repeatability of data links, and can also be used in POF-based sensors.

Couplers / splitters (1×2, 1×N and N×N) based on butting of polished fibre ends using inexpensively produced mechanical parts based on polymer mould design techniques have been developed. Excess loss is consistently less than 3dB.

Current research focuses on Wavelength Division Multiplexing (WDM) capable POF based couplers for peer-to-peer communication in networking and industrial applications as well as optical amplification of light in POF.

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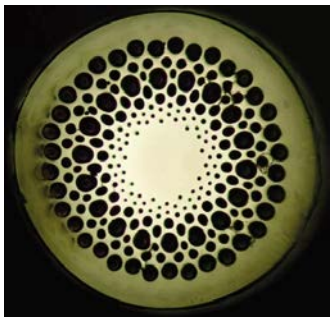
Sensors

Passive and dynamic displacement POF sensors have been developed. A non-contact, intensity-based, extrinsic and differential sensor for displacement and vibration measurements utilizes three POF, has linear response and scalable range to almost 100 mm with 1% accuracy and can be adapted to other dynamic measurands. Another POF sensor arranged as a 2×2 coupler can monitor large structural movements.

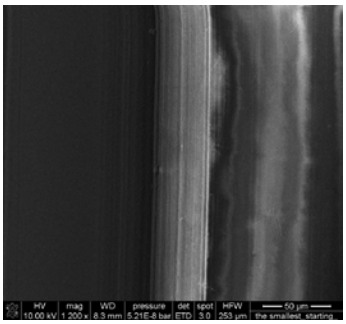
Current research focuses on the adaptability of these sensors to other measurands.

Nanotechnology

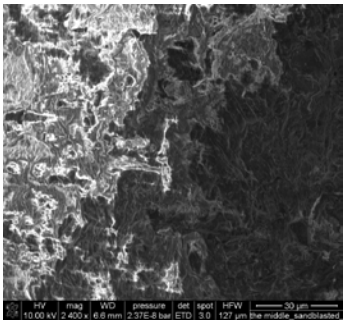
Collaboration on aspects of nanotechnology has been established with the Molecular Nanostructures Group of IFW Dresden, Germany.



(a)



(b)



(c)

(a) *Microstructured POF with ring structures and solid core.*
(b) *Polished surface of 2mm POF magnified at 1200X.*
(c) *Sandblasted surface of 2mm POF magnified at 2400X.*

For further information please contact Professor B Virdee (b.virdee@londonmet.ac.uk)