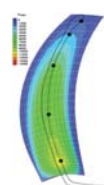
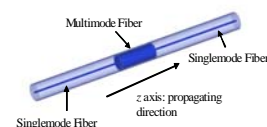
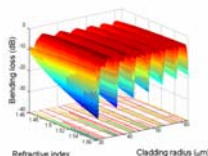


The DIT Photonics Research Centre at the Dublin Institute of Technology undertakes research in a number of areas of photonics, with a particular emphasis on optical fiber sensing at macro and micro scales. The Centre is in the College of Engineering and Built Environment and is located on the Kevin St. Campus. The Centre is led by its Director Prof. Gerald Farrell, supported by senior researchers, post-doctoral researchers and several doctoral graduate students.

MAJOR RESEARCH THEMES

FIBER OPTIC SENSORS FOR:
 Temperature, Strain, Vibration
 VOC Gas Detection
 Refractive Index
 Thermal Expansion
 Voltage and Current

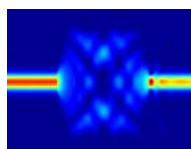
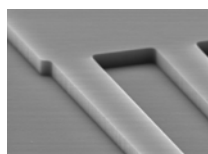
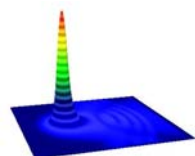
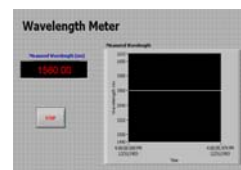


SENSOR APPLICATIONS

Smart Sensors for Engineering Structures/Composites
 Sensors for Minimally Invasive Surgical Instruments
 Breath Rate Detection for MRI scanning environments
 Acoustic detection in Gas/Oil Pipelines

SYSTEMS FOR FIBER SENSING

Passive Wavelength Measurement Systems
 FBG Interrogation Systems

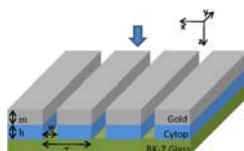
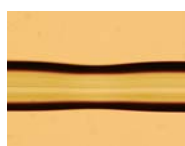
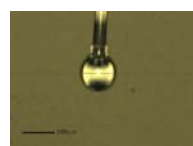
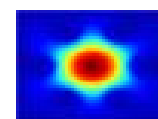
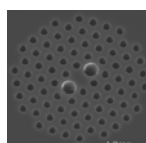


MODELLING OF PHOTONIC DEVICES

Fiber Optic Waveguides
 Planar Lightwave Circuits
 Photonic Crystal Fibers
 Microresonators

PHOTONIC CRYSTAL FIBER BASED SENSORS

Liquid Crystal Infiltrated PCF Devices and Sensors
 PCF Interferometric Sensors
 Sensors for Humidity and Dew-point



NANOPHOTONICS FOR BIO AND CHEMICAL SENSING

Tapered Fiber Devices and Sensors
 Microcouplers
 Microresonators
 Surface Plasmon Resonance Devices

RESEARCH COLLABORATIONS IN EUROPE, CHINA AND INDIA



Recent (2014-2015) Journal Publications from the Photonics Research Centre

1. Wang, P., Lee, M., Ding, M., Lian, Z., Feng, X., Ma, Y., Bo, L., Guan, C., Wu, Q., Semenova, Y., Loh, G., Farrell, G. and Brambilla, G.: "White Light Trapping Using Supercontinuum Generation Spectra in a Lead-Silicate Fibre Taper", *IEEE Journal of Lightwave Technology*, Vol. 32, No. 1, pp. 40-45, 2014, DOI: [10.1109/JLT.2013.2289305](https://doi.org/10.1109/JLT.2013.2289305)
2. Bo, L., O'Mahony, C.C., Semenova, Y., Gilmartin, N., Wang, P. and Farrell, G.: "Microfiber Coupler Based Label-free Immunosensor", *Optics Express*, Vol. 22, Issue 7, pp. 8150-8155, 2014, DOI: [10.1364/OE.22.008150](https://doi.org/10.1364/OE.22.008150)
3. Ramakrishnan, M., Rajan, G., Semenova, Y., Woliński, T., Domański, A. and Farrell, G.: "A Miniaturized Flexible Surface Attachable Interrogator for Hybrid Optical Fiber Sensing", *Microwave and Optical Technology Letters*, Volume 56, Issue 5, pages 1167–1174, May 2014, DOI: [10.1002/mop.28284](https://doi.org/10.1002/mop.28284)
4. Yuan, J., Sang, X., Wu, Q., Zhou, G., Yu, C., Wang, K., Yan, B., Han, Y., Farrell, G. and Hou, L.: "Efficient and broadband Stokes wave generation by degenerate four-wave mixing at the mid-infrared wavelength in a silica photonic crystal fiber", *Optics Letters*, Vol. 38, Issue 24, pp. 5288-5291 (2013), DOI: [10.1364/OL.38.005288](https://doi.org/10.1364/OL.38.005288)
5. Ma, Y., Farrell, G., Semenova, Y., Chan, H.P., Zhang, H. and Wu, Q., "Low Loss, High Extinction Ratio and Ultra-Compact Plasmonic Polarization Beam Splitter", *Photonics Technology Letters*, Vol. 26, No. 7, pp 660-663, 2014, DOI: [10.1109/LPT.2014.2302354](https://doi.org/10.1109/LPT.2014.2302354)
6. Ma, Y., Farrell, G., Semenova, Y. and Wu, Q., "A hybrid nanowedge plasmonic waveguide for low loss propagation with ultra-deep-subwavelength mode confinement", *Optics Letters*, Vol. 39, Iss. 4, pp. 973–976 (2014), DOI: [10.1364/OL.39.000973](https://doi.org/10.1364/OL.39.000973)
7. Yuan, J., Zhou, G., Liu, H., Xia, C., Sang, X., Wu, Q., Yu, C., Wang, K., Yan, B., Han, Y., Farrell, G. and Hou, H.: "Blue-shifted dispersive wave generation by the diffraction-arrested solitons for coherent anti-Stokes Raman scattering microscopy in a photonic crystal fiber", *Optics Communications*, Vol. 320, 1 June 2014, pp. 73–76, DOI: [10.1016/j.optcom.2014.01.051](https://doi.org/10.1016/j.optcom.2014.01.051)
8. Ramakrishnan, M., Rajan, G., Semenova, Y., Callaghan, D. and Farrell, G.: "Investigation of the effect of vibration amplitude on vibration measurements of polarimetric fiber sensors embedded in composite beams", *Smart Materials and Structures*, Vol. 23, No. 4, March 2014, DOI: [10.1088/0964-1726/23/4/045037](https://doi.org/10.1088/0964-1726/23/4/045037)
9. Ramakrishnan, M., Rajan, G., Semenova, Y. and Farrell, G.: "Hybrid Fiber Optic Sensor System for Measuring the Strain, Temperature and Thermal strain of Composite Materials", *IEEE Sensors Journal*, Vol. 14, No. 8, June 2014, pp. 2571 – 2578, DOI: [10.1109/JSEN.2014.2306892](https://doi.org/10.1109/JSEN.2014.2306892)
10. Rajan, G., Ramakrishnan, M., Ambikarajah, E., Farrell, G., Peng, G-D.: "Experimental Study and Analysis of a Polymer Fiber Bragg Grating Embedded in a Composite Material", *Journal of Lightwave technology*, Vol. 32, Issue 9, pp. 1726-1733 (2014), DOI: [10.1109/JLT.2014.2311441](https://doi.org/10.1109/JLT.2014.2311441)
11. Wang, P., Ding, M., Bo, L., Guan, C., Semenova, Y., Sun, W., Yuan, L., Brambilla, G. and Farrell, G.: "A photonic crystal fiber half taper probe based refractometer", *Optics Letters* Vol. 39, No. 7, pp. 2076–2079, 2014, DOI: [10.1364/OL.39.002076](https://doi.org/10.1364/OL.39.002076)
12. Wu, Q., Yang, M., Yuan, J., Chan, H.P., Ma, Y., Semenova, Y., Wang, P., Yu, C. and Farrell, G.: "The use of a bend singlemode-multimode-singlemode (SMS) fiber structure for vibration sensing", *Optics & Laser Technology*, Vol. 63, November 2014, pp. 29–33, DOI: [10.1016/j.optlastec.2014.03.015](https://doi.org/10.1016/j.optlastec.2014.03.015)
13. Ramakrishnan, M., Rajan, G., Semenova, Y., Zhou, Y., Jerrams, S. and Farrell, G.: "A photonic crystal fiber based polarimetric sensor for cure monitoring of magneto-rheological smart composite material", *Electronics Letters*, Vol. 50, No. 15, 17th July 2014, pp. 1083 – 1084, DOI: [10.1049/el.2013.4233](https://doi.org/10.1049/el.2013.4233)
14. Wang, P., Ding, M., Murugan, G.S., Bo, L., Guan, C., Semenova, Y., Wu, Q., Farrell, G. and Brambilla, G.: "Packaged high-Q microsphere resonator based add-drop filter", *Optics Letters*, Vol. 39, Issue 17, pp. 5208-5211, 2014, DOI: [10.1364/OL.39.005208](https://doi.org/10.1364/OL.39.005208)
15. Kang, Z., Zhang, X., Yuan, J., Sang, X., Wu, Q., Farrell, G. and Yu, C.: "Resolution enhanced all-optical analog-to-digital converter employing cascade optical quantization operation", *Optics Express*, Vol. 22, Issue 18, pp. 21441-21453 (2014), DOI: [10.1364/OE.22.021441](https://doi.org/10.1364/OE.22.021441)
16. Zhang, X., Yuan, J., Zou, J., Jin, B., Sang, X., Wu, Q., Yu, C. and Farrell, G.: "Enhanced broadband parametric wavelength conversion in silicon waveguide with the multi-period grating", *IEEE Photonics Journal*, Vol. 6, No. 6, November 2014, DOI: [10.1109/JPHOT.2014.2366150](https://doi.org/10.1109/JPHOT.2014.2366150)
17. Kang, Z., Yuan, J., Zhang, X., Wu, Q., Sang, X., Farrell, G., Yu, C., Li, F., Tam, H.Y. and Wai, P.A.: "CMOS-compatible 2-bit optical spectral quantization scheme using a silicon-nanocrystal-based horizontal slot waveguide", *Nature Scientific Reports*, Vol 4, Article No. 7177, November 24th 2014, DOI: [10.1038/srep07177](https://doi.org/10.1038/srep07177)
18. Wang, P., Ward, J., Yang, Y., Feng, X., Brambilla, G., Farrell, G. and Nic Chormaic, S.: "Lead-silicate glass optical microbubble resonator", Accepted for publication in *Applied Physics Letters*, February 2015, DOI: