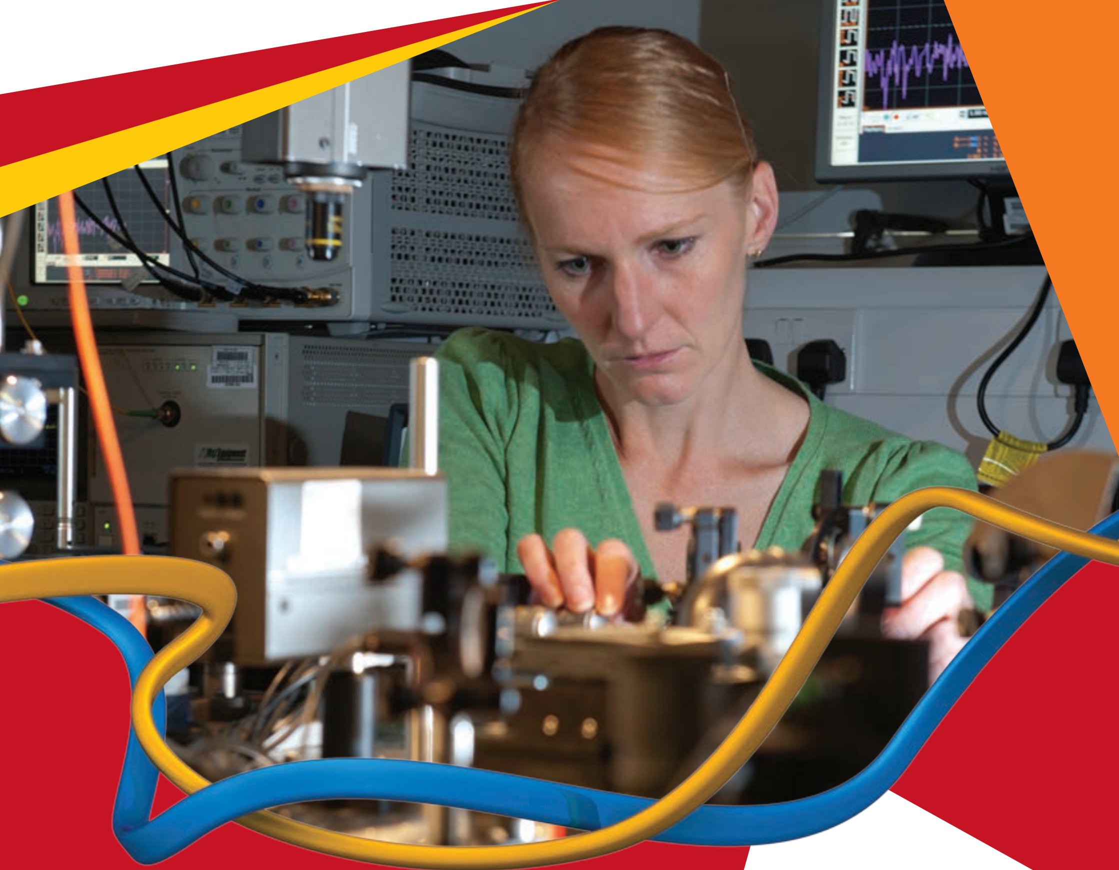

# Professor Anna Peacock

**Research Fellow**

**Professor Anna Peacock** is head of the Semiconductor Fibre Devices for Nonlinear Photonics group at the University of Southampton. From 2007 to 2012, her research on optical fibres was supported by a Royal Academy of Engineering Research Fellowship. She made significant progress towards benchmarking the performance of novel fibres for signal processing applications, which are of huge commercial relevance.

ROYAL ACADEMY OF ENGINEERING

“The key thing is that the fellowship gave me the independence to set my own research direction, to steer my research.”

## RESEARCH

Professor Peacock investigates how filling optical fibres with other materials can affect their performance in transmitting and processing signals. Before being awarded a Research Fellowship, she was investigating metal-filled fibres, but the Academy’s funding allowed her to expand her research into semiconductor-filled fibres, in collaboration with researchers at Penn State in the USA. During her Fellowship, she was able to reduce signal losses in these fibres significantly as she investigated ways to optimise both the design of the fibres and the quality of the materials used to make them.

Professor Peacock aims to develop photonics systems which can seamlessly link into existing infrastructure in which electronic, rather than optical, processing is used. The challenge is to produce photonics circuits that can transmit, amplify and modulate signals just like their electronic equivalents – and do so efficiently. The Fellowship enabled a significant breakthrough when she developed a laser processing technique to modify the structure of silicon as it is crystallised in a semiconductor-filled fibre. This allows precision engineering of the silicon core within a fibre to enhance its functionality, which can then be exploited in both optical and electronic applications.

## IMPACT

Developing an all-fibre optical switching system, rather than succumbing to the losses associated with passing a signal back and forth between optical and electrical elements, can improve the efficiency and reduce the costs of telecommunications systems. Optoelectronic systems can also be deployed in medicine, imaging, spectroscopy and sensing – any applications where light and electronics both play a part – providing huge scope for savings. Aside from fibres, the materials systems that Professor Peacock developed during her Fellowship also have applications in planar photonics and are now being translated onto chips, with interest from large silicon photonics companies.

The Fellowship also provided an opportunity to investigate novel aspects of these fibres – such as using their large non-linear properties to generate new colours of light, and modulating light at ultrafast speeds. Work continues to reduce the transmission losses, but the concept has now been demonstrated.

## PROFESSIONAL DEVELOPMENT

“The different aspects of research I’m now working on have all evolved from the ideas that I was given the opportunity to develop during the Fellowship,” says Professor Peacock. From practical demonstrations to more exploratory research, the extended time available enabled her to build a research base across a range of areas including optical fibres, silicon photonics and nonlinear optics.

## RESEARCH FELLOWSHIPS

The Royal Academy of Engineering Research Fellowships are designed to promote excellence in engineering. Applications are welcomed from outstanding early-career researchers who are about to finish their PhD or have been awarded their PhD in the last three years. The scheme provides funding for five years to encourage the best researchers to remain in the academic engineering sector.

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