

# International Engagement

Enabling worldwide partnerships in research

*The Engineering and Physical Sciences Research Council (EPSRC) supports a wide range of international collaboration in science and engineering. We currently invest over £400 M in international related research and training.*

*Using our comprehensive knowledge of UK research and our growing understanding of the global scene, we want to enable the best UK research organisations to work with the best organisations from the rest of the world.*

*This series of case studies provide real examples of how EPSRC is helping to further international partnerships for the long term future of engineering and physical sciences research.*

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## Looking Deep into Tissues with the US

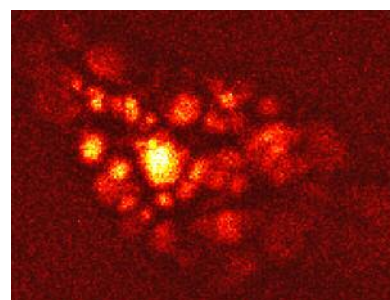
Researchers in the UK and USA have combined microscopy expertise to look deeper and closer into living organisms.

Scientists at the University of Strathclyde in Scotland have developed the technique of using adaptive optics to correct for sample-induced distortions in optical microscopy images, and 'sharpen-up' image resolution by up to 10 times. Meanwhile, at Harvard University in the USA, a specialist Imaging group in the chemistry department have invented a non-invasive, chemically-selective 'CARS' microscopy technique to look into living samples without the need for dyes and markers. A huge range of materials can be investigated with these techniques, and in CARS microscopy, complex molecules with minor differences can be differentiated in living organisms without the need to remove tissue samples.

The two groups had been working independently on these two complimentary methods for some time, but when Professor John Girkin of Strathclyde's Institute of Photonics gave an invited talk about adaptive optics at an international conference in 2007, the groups had an opportunity to meet, and an international research collaboration was sparked.

Following some initial planning e-mails and meetings, EPSRC provided researchers from Strathclyde with a £6,000 travel grant to cover travel costs and subsistence for a two week visit to Professor Sunny Xie's group at Harvard to undertake the experiment. The groups were successful in combining their two techniques; improving the resolution of the CARS microscope images by 6 times, greatly increasing the sensitivity of this non-invasive diagnosis technique.

These initial results have been published and the two groups are now proceeding with further collaborative work: Strathclyde are helping Harvard to establish a permanent adaptive optic system; Harvard have filed patent on the method and discussions are underway with Leica Microsystems and Olympus; reciprocal visits of researchers between the two Universities are continuing; and the groups are considering applying for grants from EPSRC, NSF and NIH for continued collaborations.



All images courtesy of Institute of Photonics

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