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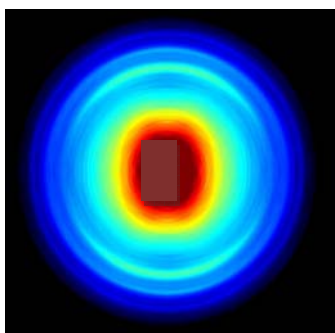
Research Interests: gas phase studies of fullerenes and atomic clusters; growth mechanisms, properties and applications of carbon nanotubes



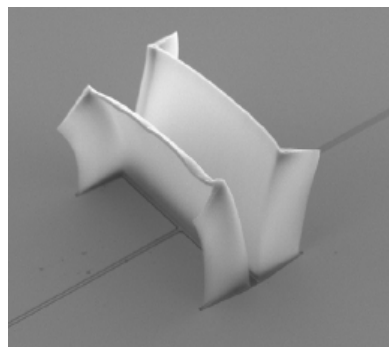
The group is interested in a range of topics from very fundamental studies of the interaction of femtosecond laser pulses with complex molecules and clusters to the study of chemical vapour deposition growth of carbon nanotubes and their properties and potential applications.

The fundamental gas phase fs studies provide information on the complex intramolecular energy coupling timescales and mechanisms in systems with a large but finite number of degrees of freedom. Earlier, we have looked at the process of intracluster molecular fusion of fullerenes that can occur when clusters of fullerenes are highly excited on a sub ps timescale and we are now transferring this idea to the modification of carbon nanotubes. We are also using a photoelectron velocity map imaging (VMI) spectrometer that allows us to study the time-, energy- and emission angle-dependence of photoelectrons produced from complex molecules and clusters excited by ultrashort laser pulses. By using fs/ps pump-probe techniques we can learn about the formation and relaxation dynamics of the excited electronic states.

The carbon nanotube activities involve the fabrication and characterisation of nanoelectromechanical systems based on carbon nanotubes, the study of carbon nanotube growth using a variety of chemical vapour deposition techniques and *in situ* spectroscopy methods and their chemical functionalisation and nanoscale manipulation. We are also involved in a European collaboration that is concerned with the design and investigation of the interface between plasmonic nanoantennas and nanotubes in order to allow for the simultaneous optical and electrical characterization of the nanosystems.



Inverted VMI image of the photoelectrons produced from 400nm 120 fs irradiation of C₆₀. The radial coordinate gives the electron kinetic energy while the polar angle gives the emission angle with respect to the laser polarization direction.



A varactor (variable capacitor) made from two walls of vertically aligned carbon nanotubes

SELECTED RECENT PUBLICATIONS

Momentum-map-imaging photoelectron spectroscopy of fullerenes with femtosecond laser pulses, M. Kjellberg, O. Johansson, F. Jonsson, A. V. Bulgakov, C. Bordas, E. E. B. Campbell and K. Hansen, *Phys. Rev. A* **81**, 023202 (2010)

Dispersing Individual Single-Wall Carbon Nanotubes in Aqueous Surfactant Solutions below the cmc, P. Angelikopoulos, A. Gromov, A. Leen, O. Nerushev, H. Bock, E. E. B. Campbell, *J.Phys.Chem. C* **114**, 2 (2010)

Effect of catalyst pattern geometry on the growth of vertically aligned carbon nanotube arrays, G.H. Jeong, N. Olofsson, L.K.L. Falk, E.E.B. Campbell, *Carbon* **47** (2009) 696-704

Determination of the effective Young's modulus of vertically aligned carbon nanotube arrays: a simple nanotube-based varactor, N. Olofsson, J. Ek-Weis, A. Eriksson, T. Idda, E.E.B Campbell, *Nanotechnology* **20** (2009) 385710