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Dr Haider Butt BEng, MPhil, PhD, Cantab

Lecturer in Micro Engineering and Nanotechnology

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About

Haider Butt has recently been selected as the Lecturer of Micro Engineering and Nanotechnology at the School of Mechanical Engineering, University of Birmingham. Previously he was a Henslow Research Fellow at the Department of Engineering, University of Cambridge, from where he also received his PhD in April 2012. His fellowship was sponsored by the Cambridge Philosophical Society.

Haider has published over 25 peer reviewed journal papers and around 20 conference publications. His research work focusses on photonic devices based on nanostructures like carbon nanotubes, graphene, silicon nano-pillars and plasmonic nanostructures.

His research work has received substantial recognition in the form of awards and media interviews. In 2010 he received an Ambitious Research Award from the Institution of Engineering and Technology (IET) in recognition of his research work. And in April 2013 he was awarded the ABTA Doctoral Research Award for his work on “carbon nanotubes based holograms”.

Haider Butt also received the prestigious **Philip Leverhulme Prize 2013**. The prize, valued £70,000, was awarded to Haider for his outstanding and recognised contribution to his area of research. See **www.leverhulme.ac.uk/files/seealsodocs/1548/2013-PLP.PDF (http://www.leverhulme.ac.uk/files/seealsodocs/1548/2013-PLP.PDF)**

Qualifications

- PhD in Engineering, University of Cambridge, April 2012
- MPhil in Engineering (research), University of Cambridge, 2008
- BEng (Hons), National University of Computer & Emerging Sciences (NUCES), Pakistan, 2007

Biography

Haider did his BEng (hons) in Telecommunication Engineering from National University of Computer & Emerging Sciences (NUCES), Pakistan (2007). His major was in electromagnetic modelling of electronic devices. During his MPhil research at the Department of Engineering, University of Cambridge (2008) he worked on the liquid crystals based electro-optical devices. Haider received Cambridge University sponsored Cambridge Commonwealth Trust Scholarship in support of this MPhil degree. Following is MPhil Haider did a cross disciplinary PhD at the University of Cambridge under the supervisions of Prof. Timothy D. Wilkinson and Prof. Gehan A. J. Amaratunga.

This PhD work consisted of characterizing carbon nanotubes based nanophotonic devices, such as metamaterials. This project was jointly funded by Prof. Gehan Amaratunga's Nokia Research Grant, Hughes Hall Scholarship and Cambridge Commonwealth Trust Scholarship. Haider successfully completed his PhD in April 2012 with several postgraduate research awards and over 10 Journal publications.

In October 2012 Haider received the Henslow Research Fellowship at Wolfson College, University of Cambridge. This prestigious fellowship was sponsored by the Cambridge Philosophical Society. During his fellowship Haider continued his independent research of nanostructures based high resolution holograms and plamonics devices. His research work received international recognition and was highlight in media and prestigious news journals like Nature News and Views.

Cambridge holograms pave way for biosensors, Business Weekly (April 2013) (http://www.businessweekly.co.uk/biomedtech-/15217-cambridge-holograms-pave-way-for-biosensors)

Optics: Nanotube holograms, S. Larouche and D. R. Smith, **Nature 491, 47 (2012) (http://www.nature.com/nature/journal/v491/n7422/full/491047a.html)**

New Use for Those Incredible Nanotubes: Holograms
Charles Q. Choi, InnovationNewsDaily Contributor, September 2012 (http://www.livescience.com/23022-new-use-for-those-incredible-nanotubes-holograms.html)

Teaching

Teaching Programmes

- Electrical Engineering
- Introduction to MEMs

Postgraduate supervision

PhD in nanophotonic research (http://www.findaphd.com/search/ProjectDetails.aspx?PJID=46579)

Doctoral research

PhD title Carbon nanotubes based photonic devices

Research

Research themes

Haider Butt is interested in research areas like high resolution holograms, metamaterials, diffraction optics, bio-sensors, plasmonics, and liquid crystals based electro-optical devices.

Other activities

Awards and recognitions

- College Best Paper prize
  The paper *"Devitrite based optical Diffusers", ACS Nano, 10.1021/nn500155e* received the best paper of the month prize (worth £1000) in Feburary 2014 by the College of Engineering and Physical Sciences, University of Birmingham.
- Philip Leverhulme Prize 2013
  This Prize, with a value of **£70,000**, is awarded to outstanding scholars who have made a substantial and recognised contribution to their particular field of study, recognised at an international level, and where the expectation is that their greatest achievement is yet to come. **(link) (http://www.leverhulme.ac.uk/files/seealsodocs/1548/2013-PLP.PDF)**
- ABTA Doctoral Research Travel Award October 2013
  A award presented by the Association of British Turkish Academics (ABTA), under the Academic Mobility Programme, to enable outstanding researchers to visit top University in Istanbul. **(link) (http://abtanet.org.uk/Awards/Detail/4/2013-Doctoral-Travel-Awards/Winners)**
- ABTA Doctoral Research Travel Award September 2013
  A award presented by the Association of British Turkish Academics (ABTA), under the Academic Mobility Programme, to enable outstanding researchers to visit top University in Istanbul. **(link) (http://abtanet.org.uk/Awards/Detail/4/2013-Doctoral-Travel-Awards/Winners)**
- ABTA Doctoral Researcher Award 2013
  A national award awarded by the Association of British Turkish Academics (ABTA) to recognise the scientific excellence of young researchers. **(link) (http://www.wolfson.cam.ac.uk/news/abta-doctoral-researcher-award-2013-wolfson-fellow)**
- Interviewed by Business Weekly
  Gave an interview regarding my research work to the CEO of Business Weekly. The interview was published as:
  Cambridge holograms pave way for biosensors, Business Weekly (April 2013) (http://www.businessweekly.co.uk/biomedtech-/15217-cambridge-holograms-pave-way-for-biosensors)
- Invited talk at the Parliament of UK in the event SET for BRITAIN 2013
  Gave a poster presentation titled "Carbon nanotube based holograms" to the members of parliament and key scientists
- Research of nanotube holograms spotlighted in several popular science news websites
  - New Use for Those Incredible Nanotubes: Holograms
    Charles Q. Choi, InnovationNewsDaily Contributor, September 2012 (http://www.livescience.com/23022-new-use-for-those-incredible-nanotubes-holograms.html)
  - Making high-resolution holograms with nanoscale pixels
    Michael Berger. Nanowerk, October 2012 (http://www.nanowerk.com/spotlight/spotid=26858.php)
  - **Bright idea: Carbon nanotube Fresnel lenses (October 2012) (http://www.eng.cam.ac.uk/news/stories/2012/Carbon_nanotube_Fresnel_lenses/)**
  - **Nanotubes used to create smallest ever hologram pixels (September 2012) (http://www.cam.ac.uk/research/news/nanotubes-used-to-create-smallest-ever-hologram-pixels/)**
- Best conference paper award (April, 2011)
  At Saudi International Electronics, Communications and Photonics Conference (SIECPC), Riyadh, for the work titled "Optical waveguides and switches based on periodic arrays of carbon nanotubes"
- IET Postgraduate Ambitious Award (2010)
  Received a national postgraduate award of £2500 from the Institution of Engineering and Technology (IET), for ambitious and innovative research conducted.
- Featured in **IET Meet the students case study (http://www.theiet.org/students/studying-engineering/meet-students/haider-butt.cfm)**.

Acting reviewer for prestigious peer-reviewed journals

- ACS Nano (ACS Publications)
- Progress In Electromagnetics Research (PIER)
- Optics Express
- Nanoscale Research Letters
- Sensors & Actuators: A. Physical

Publications

Journal Publications

- A. A. Khan, D. Dabera, Haider Butt, M. M. Qasim, G. A. J. Amaratunga, S. Ravi P. Silva and T. D. Wilkinson, Tunable Scattering from Liquid Crystal Devices using Carbon Nanotube Network Electrodes, **Nanoscale**, (**2014 (http://pubs.rsc.org/en/content/articlelanding/2014/nr/c4nr04466e#!divAbstract)**)
- Pritesh Hiralal, Chihtao Chien, Niraj N. Lal, Waranatha Abeygunasekara, Haider Butt, Abhishek Kumar, Hang Zhou, Husnu Emrah Unalan, Jeremy J. Baumberg and Gehan A. J. Amaratunga, Nanowire-based Multifunctional Antireflection coatings for Solar cells, **Nanoscale**, 6, 14555-14562 (**2014 (http://pubs.rsc.org/en/content/articlelanding/2014/nr/c4nr01914h#!divAbstract)**)
- X.T. Kong, Haider Butt*, A.K. Yetisen, C. Kangwanwatana, Y. Montelongo, S. Deng, F.C. Vasconcellos, M.M. Qasim, T.D. Wilkinson, Q. Dai, Enhanced reflection from inverse tapered nanocone arrays, **Applied Physics Letters,** 105, 053108 **(2014) (http://dx.doi.org/10.1063/1.4892580)**
- Tong Zhang, Xuefeng Liu, Qin Chen, Jing Chen, and Haider Butt, Plasmonics and Nanophotonics, Journal of Nanomaterials, 2014, 746195, (**2014 (http://www.hindawi.com/journals/jnm/2014/746195/cta/)**)
- Sunan Deng, Ali K. Yetisen, Kyle Jiang, Haider Butt, Computational modelling of a graphene Fresnel lens on different substrates, RSC Advances, 4, 30050-30058, (**2014 (http://pubs.rsc.org/en/content/articlelanding/2014/ra/c4ra03991b#divAbstract)**)
- A. K. Yetisen, Y. Montelongo, F.C.Vasconcellos, J.L. Martinez-Hurtado, S. Neupane, Haider Butt, M. M. Qasim, J. Blyth, K. Burling, J.B. Carmody, M.Evans, T.D. Wilkinson, L.T. Kubota, M. J. Monteiro□, C.R. Lowe, Reusable, Robust, and Accurate Laser-Generated Photonic Nanosensor, **Nano Letters**, **(2014) (http://pubs.acs.org/doi/abs/10.1021/nl5012504)**
- F. d. C. Vasconcellos, A. K. Yetisen, Y. Montelongo, Haider Butt, A. Grigore, C. A. B. Davidson, J. Blyth, M. J. Monteiro, T. D. Wilkinson, C. R. Lowe, Printable

Surface Holograms via Laser Ablation, **ACS Photonics**, DOI: 10.1021/ph400149m, **(2014) (http://pubs.acs.org/doi/abs/10.1021/ph400149m)**

- Haider Butt, K. M. Knowles, Y. Montelongo, G. A. J. Amaratunga, T. D. Wilkinson, Devitrite-Based Optical Diffusers, **ACS Nano**, 8 (3), pp 2929–2935 **(2014) (http://pubs.acs.org/doi/abs/10.1021/nn500155e)**

This paper was highlighted in **Nature**journal: "Waste glass finds diffuse use", **Nature**, 507, 11 **(06 March 2014) (http://www.nature.com/nature/journal/v507/n7490/full/507011c.html?message-global=remove)** . It was featured as the front cover image of the March 2014 issue of **ACS Nano Journal (http://pubs.acs.org/toc/ancac3/current)** . The paper was also highlighted on the websites of the **Birmingham (http://www.birmingham.ac.uk/university/colleges/eps/news/college/2014/From-waste-to-important-new-optical-diffuser.aspx)** and **Cambridge (http://www.cam.ac.uk/research/news/new-use-for-an-old-trouble-maker)** Universities. A case study on this research has been published by *The American Ceramic Society* titled as **Trash to treasure: Glass devitrite crystals as novel optical diffusers (http://ceramics.org/ceramic-tech-today/trash-to-treasure-glass-devitrite-crystals-as-novel-optical-diffusers)**

- C. P. Tsangarides, A. K. Yetisen, F. C. Vasconcellos, Y. Montelongo, M. M. Qasim, T. D. Wilkinson, C. R. Lowe, H. Butt, Computational modelling and characterisation of nanoparticle-based tuneable photonic crystal sensors, **RSC Advances**, 4, 10454-10461, **(2014) (http://pubs.rsc.org/en/content/articlelanding/2014/ra/c3ra47984f#!divAbstract)**
- A. K. Yetisen, H. Butt, F. C. Vasconcellos, Y. Montelongo, C. A. B. Davidson, J. Blyth, L. Chan, J. B. Carmody, S. Vignolini, U. Steiner, J. J. Baumberg,T. D. Wilkinson,C. R. Lowe, Light-Directed Writing of Chemically Tunable Narrow-Band Holographic Sensors, **Advanced Optical Materials,** 2 (3), 250–254, **(2014) (http://onlinelibrary.wiley.com/doi/10.1002/adom.201300375/abstract)**

This paper has been highlighted on the website of Department of Chemical Engineering and Biotechnology, University of Cambridge: **Responsive holograms act as sensors for medical diagnostic applications (http://www.ceb.cam.ac.uk/news/news-list/holosensors)**

- H. Butt, P. R. Kidambi, B. Dlubak, Y. Montelongo, A. Palani, S. Hofmann, T. D. Wilkinson, Visible diffraction from Graphene for applications in holograms, **Advanced Optical Materials (In Press) (http://onlinelibrary.wiley.com/doi/10.1002/adom.201300320/abstract)**
- Y. Montelongo, B. Chen, Haider Butt, J. Robertson, T. D. Wilkinson, High contrast holograms using nanotube forest, **Applied Physics Letters**, 103, 11 (2013)
- D.-H Ko, S. M. Morris, A. Lorenz, F. Castles, H Butt, D. J. Gardiner, M. M. Qasim, B. Wallikewitz, P. J. W. Hands, T. D. Wilkinson, G. A. J. Amaratunga, H. J. Coles, R. H. Friend, A nano-patterned photonic crystal laser with a dye-doped liquid crystal, **Applied Physics Letters**, 103, 051101 (2013)

This paper was featured as the front cover image of the July 2013 issue of **Applied Physics Letters Journal (http://apl.aip.org/resource/1/applab/v101/i25)** :

- K. Won, A. Palani, H. Butt, P. J. W. Hands, Ranjith R., Q. Dai, A. A. Khan, G. A. J. Amaratunga, H. J. Coles, T. D. Wilkinson, Electrically Switchable Diffraction Grating Using a Hybrid Liquid Crystal and Carbon Nanotube-Based Nanophotonic Device,**Advanced Optical Materials**, 1, 368-373, (2013)

This paper has been spotlighted in the frontispiece image of the upcoming issue of **Advanced Optical Materials**Journal.

- Y. Montelong, H. Butt, T. Butler, T.D. Wilkinson, G.A.J. Amaratunga, Characterization of Carbon Nanotube Array based Computer Generated Holograms, **Nanoscale,** 5, 4217-4222, (2013)
- H. Butt, Ranjith R., Q. Dai, S. Sarfraz, R. V. Kumar, G. A. J. Amaratunga, T. D. Wilkinson, Cylindrical Fresnel lenses based on carbon nanotube forests, **Applied Physics Letters,** 101, 243116 (2012)

This paper was highlighted by Nature Photonics in the Research Highlights section as:
"Black Forest", R. Won, Nature Photonics 7, 166 (2013) (http://www.nature.com/nphoton/journal/v7/n3/full/nphoton.2013.51.html)

- H. Butt, T. Butler, Y. Montelong, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Continuous Diffraction Patterns from Circular Arrays of Carbon Nanotubes, **Applied Physics Letters**, 101, 251102 (2012)

This paper was featured as the front cover image of the December 2012 issue of **Applied Physics Letters Journal (http://apl.aip.org/resource/1/applab/v101/i25)**

- H. Butt, Y. Montelong, R. Ranjith, T. Butler, Q. Dai, T.D. Wilkinson, G.A.J. Amaratunga, Carbon Nanotubes based high resolution holograms, **Advanced Materials,** 24, OP331 (2012)

This paper was featured in the News & Views section of **Nature**Journal:

- Optics: Nanotube holograms, S. Larouche and D. R. Smith,
  Nature 491, 47 (2012) (http://www.nature.com/nature/journal/v491/n7422/full/491047a.html)

The research was featured as the cover image of **Advanced Optical Materials**. It was also highlighted on several popular science news websites and on the University of Cambridge Research News pages.

- H. Butt, Q. Dai, N. N. Lal, T. Butler, T.D. Wilkinson, J.J Baumberg, G.A.J. Amaratunga, Metamaterial filter for the near-visible spectrum **Applied Physics Letters,** 101, 083106 (2012)
- Q. Dai, R. Ranjith, H. Butt, K. Won, T.D. Wilkinson, G.A.J. Amaratunga, Ultra-small microlens array based on vertically-aligned carbon nanofibers,**Small,** 8, 2501 (2012)
- H. Butt, Q. Dai, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Negative index photonic crystal lenses based on carbon nanotube arrays, **Photonics and Nanostructures - Fundamentals and Applications,** 10, 499 (2012)
- Ranjith, H. Butt, Q. Dai, R. T.D. Wilkinson, G.A.J. Amaratunga, Can nanotubes be lens array?, **Advanced Materials,** 23, OP170 (2012)
- Q. Dai, H. Butt, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Fabrication of carbon nanotubes on active backplanes for switchable nanophotonic devices,**Progress in Electromagnetics Research**, 127, 65-77, (2012)
- R. Ranjith, Q. Dai, H. Butt, K. Won, T.D. Wilkinson, G.A.J. Amaratunga, Optimization of nanotube electrode geometry in a liquid crystal media from wavefront aberrations, **Applied Optics,** 50,341 (2011)
- H. Butt, T.D. Wilkinson, G.A.J. Amaratunga, FEM modelling of periodic arrays of multiwalled carbon nanotubes, **Progress in Electromagnetics Research M,**22, 1-12, (2012)
- H. Butt, Q. Dai, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Plasmonic band gaps and waveguide effects in carbon nanotube arrays based metamaterials, **ACS Nano**, 5 (11), (2011)
- H. Butt, Q. Dai, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Enhanced reflection from arrays of silicon based inverted nanocones, **Applied Physics Letters,** 99 (13), 133105 (2011)
- H. Butt, R. Ranjith, T.D. Wilkinson, G.A.J. Amaratunga, Electromagnetic Modeling of Multiwalled Carbon Nanotubes as Nano-Rod Electrodes for Optimizing Device Geometry in a Nanophotonic Device, **IEEE Transactions on Nanotechnology,** 10 (3), 547 - 554, (2011)
- H. Butt, Q. Dai, T.D. Wilkinson, G.A.J. Amaratunga, Photonic crystals and metamaterial filters based on 2D arrays of silicon nanopillars, **Progress in Electromagnetics Research**, 113, 179, (2011)
- Q. Dai, R. Rajesekharan, H. Butt, K. Won, X. Wang, T.D. Wilkinson, G. Amaratunga, Transparent liquid crystal based microlens array using vertically aligned carbon nanofibre electrodes on quartz substrates, **Nanotechnology,** 22 (11), 115201, (2011)

- H. Butt, Q. Dai, P. Farah, T. Butler, T.D. Wilkinson, J.J Baumberg, G.A.J. Amaratunga, Metamaterial high pass filter based on periodic wire arrays of multiwalled carbon nanotubes, **Applied Physics Letters**, 97 (16), 163102, (2010)
- Ranjith. R, H. Butt, T.D. Wilkinson, Optical Phase Modulation using a Hybrid Carbon Nanotube-Liquid Crystal Nano Photonic Device, **Optics Letters,** 34 (9), (2009)

Patents

- H. Butt, K. Knowles, *Devitrite based optical diffusers, **Patent (Filed September 2013)***

Book Chapters

- Timothy D Wilkinson, Haider Butt, Yunuen Montelongo -
  Holographic Liquid Crystals for Nanophotonics
  Nanoscience with Liquid Crystals, Springer International Publishing 2014
- T D Wilkinson and Haider Butt, *Carbon Nanotubes and Graphene for Photonic Applications,***Woodhead Publishing Ltd*(Aug 2013)***

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