


# Professor Daniel S. Elson

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**Nationality** *British*

## Education

1999-2002 **PhD in Ultrafast Lasers Applied to Fluorescence Lifetime Imaging, Imperial College, London.**  
**Supervisor: Professor Paul French.**  
Development and application of ultrafast lasers to fluorescence lifetime imaging, Femtosecond Optics Group, Physics Department, Funded by UK EPSRC CASE studentship and Kentech Instruments Ltd.

1995-1999 **First Class MSci (Hons) Physics, Imperial College London (Physics and Ash Scholarships).**

## Employment

2016- **Professor of Surgical Imaging and Biophotonics, Hamlyn Centre for Robotic Surgery, Institute of Global Health Innovation and Department of Surgery and Cancer, Imperial College London.**

2005-2016 **Lecturer (2005-2010), Senior Lecturer (2010-2012) and Reader (2012-2016) in Surgical Imaging, Institute of Biomedical Engineering, Hamlyn Centre for Robotic Surgery, Institute of Global Health Innovation and Department of Surgery and Cancer, Imperial College London.**

2002-2005 **Research Associate, Photonics Group, Physics Department, Imperial College London.** Funded by a UKRC Basic Technology award: *A thousand micro-emitters per square millimetre: new light on organic materials and structures (2004-2005)*; and Wellcome Trust Showcase award: *High speed wide-field functional imaging using fluorescence lifetime (2002-2004)*.

**Member of Institute of Physics, Optical Society of America, Senior Member Society of Photographic Instrumentation Engineers (SPIE).**

## Research interests

Daniel Elson is a Professor in the Hamlyn Centre for Robotic Surgery, Department of Surgery and Cancer and the Institute of Global Health Innovation. Research interests are based around the development and application of photonics technology with endoscopy for surgical imaging applications, including multispectral, polarization-resolved and fluorescence imaging, supported by computer vision and robotic guidance techniques. These devices are finding applications in minimally invasive surgery through early device clinical evaluations. This research has been funded by the ERC, EPSRC, TSB, Wellcome Trust and the NIHR, as well as collaborations with industrial partners such as Karl Storz, Covidien, Cymtec and Intuitive Surgical. The Hamlyn Surgical Imaging and Biophotonics research group currently consists of four PhD students and two RAs, and Professor Elson has published over 120 peer reviewed journal articles, one edited book, thirteen book chapters and has contributed to more than 320 conferences.

## Current funding

A miniature tethered drop-in laparoscopic molecular imaging probe for intraoperative decision support in minimally invasive prostate cancer surgery	06/19-03/23	NIHR	£990k
MedTechONE Institutional Translational Partnership Award (ITPA).	01/22-12/24	Wellcome Trust	£3,000k
Translational nanoconstructs for targeted tissue accumulation and guided surgery in cancer	02/23-01/26	EPSRC EP/X013677/1	£1,850k
Self-propelled soft robotic endoscopes for next-generation gastrointestinal surgery	06/23-0528	EPSRC	£4,451k

## Recognition in the field

- Deputy Editor in Chief Annals of Biomedical Engineering 2012-2021.
- Multiple conference programme and general chair positions per year for OPTICA, SPIE and BMES events.
- Various prizes, including three times winner of Gerhard Buess Technology award, EAES, Medical Image Analysis MICCAI Prize (2018), First Prize, Global Surgery, the Royal Society of Medicine (2018).
- Reviewer for many leading international journals (e.g. Optics Express, Optics Letters, Applied Optics, Journal of Biomedical Optics, PLoS one, Applied Physics Letters, Scientific Reports etc.)
- Reviewer for MRC, EPSRC, Royal Society, STW (Dutch research council), Vienna Science and Technology Fund (WWTF), German Research Foundation (DFG), French National Research Agency (ANR), Hong Kong Research Grants Council etc.
- Panel member for The Research Council of Norway, Medicine and Health National Initiative for Research Infrastructure, 2019, 2021, Academy of Finland, Biomedical Engineering, 2020, 2021, 2022.
- External Examiner for UCL EPSRC Centre for Doctoral Training in Medical Imaging (MRes component) 2014-18, and for Queen Mary University of London Certificate in Clinical Foundation Studies programme, 2016-present.
- Co-founder TymphaHealth.
- Co-leading Theme 2 (surgery) for national Oncology Translational Research Collaboration (O-TRC).
- Member of International Advisory Board for U-care: Deep ultraviolet light therapies, £6.1M EPSRC Programme Grant, 2021-present.

## Selected recent publications

ResearcherID: [B-4921-2008](#), ORCID:  <https://orcid.org/0000-0002-5578-3941>, [Google Scholar](#)

1. Dual-modality endoscopic probe for tissue surface shape reconstruction and hyperspectral imaging enabled by deep neural networks, J. Lin, N. T. Clancy, J. Qi, Y. Hu, T. Tatla, D. Stoyanov, L. M. Hein and **D. S. Elson**, Medical Image Analysis, (2018) doi: [10.1016/j.media.2018.06.004](https://doi.org/10.1016/j.media.2018.06.004)
2. Complex vectorial optics through gradient index lens cascades, C. He, J. Chang, Q. Hu, J. Wang, J. Antonello, H. He, S. Liu, J. Lin, B. Dai, **D. S. Elson**, P. Xi, H. Ma and M. J. Booth, Nature Communications, 10 (2019) 1-8 doi: [10.1038/s41467-019-12286-3](https://doi.org/10.1038/s41467-019-12286-3)
3. LaryngoTORS: A Novel Cable-Driven Parallel Robotic System for Transoral Laser Phonosurgery, M. Zhao, T. J. O. Vrieling, A. A. Kogkas, M. S. Runciman, **D. S. Elson** and G. P. Mylonas, IEEE Robotics and Automation Letters, 5 (2020) 1516-1523 doi: [10.1109/LRA.2020.2969186](https://doi.org/10.1109/LRA.2020.2969186)
4. Tracking and visualization of the sensing area for a tethered laparoscopic gamma probe, B. Huang, Y.-Y. Tsai, J. Cartucho, K. Vyas, D. Tuch, S. Giannarou and **D. S. Elson**, International Journal of Computer Assisted Radiology and Surgery, 15 (2020) 1389-1397 doi: [10.1007/s11548-020-02205-z](https://doi.org/10.1007/s11548-020-02205-z)
5. Tissue texture extraction in indocyanine green fluorescence imaging for breast-conserving surgery, M. Leiloglou, V. Chalau, M. S. Kedrzycki, P. Thiruchelvam, A. Darzi, D. R. Leff and **D. S. Elson**, Journal of Physics D: Applied Physics, 54 (2021) 194005 doi: [10.1088/1361-6463/abe571](https://doi.org/10.1088/1361-6463/abe571)
6. The impact of temporal variation in indocyanine green administration on tumor identification during fluorescence guided breast surgery, M. S. Kedrzycki, M. Leiloglou, V. Chalau, N. Chiarini, P. T. Thiruchelvam, D. J. Hadjiminias, K. R. Hogben, F. Rashid, R. Ramakrishnan, A. W. Darzi, **D. S. Elson** and D. R. Leff, Annals of Surgical Oncology, 28 (2021) 5617-5625 doi: [10.1245/s10434-021-10503-2](https://doi.org/10.1245/s10434-021-10503-2)
7. Intraoperative laryngeal cancer detection in vivo using surgical polarimetric endoscopy (accepted), J. Qi, T. Tatla, E. Nissanka-Jayasuriya, A. Y. Yuan, D. Stoyanov and **D. S. Elson**, Nature Biomedical Engineering, (2023)
8. Real-time tracking of a diffuse reflectance spectroscopy probe used to aid histological validation of margin assessment in upper gastrointestinal cancer resection surgery, I. Gkouzionis, S. Nazarian, M. Kawka, A. Darzi, N. Patel, C. J. Peters and **D. S. Elson**, Journal of Biomedical Optics, 27 (2022) 025001 doi: [10.1117/1.JBO.27.2.025001](https://doi.org/10.1117/1.JBO.27.2.025001)
9. Simultaneous depth estimation and surgical tool segmentation in laparoscopic images, B. Huang, A. Nguyen, S. Wang, Z. Wang, E. Mayer, D. Tuch, K. Vyas, S. Giannarou and **D. S. Elson**, IEEE Transactions on Medical Robotics and Bionics, (2022) doi: [10.1109/TMRB.2022.3170215](https://doi.org/10.1109/TMRB.2022.3170215)
10. Robotic large-area optical biopsy imaging for automated detection of gastrointestinal cancers tested in tissue phantoms and ex vivo porcine bowel, F. B. Avila-Rencoret, G. P. Mylonas and **D. S. Elson**, Translational Biophotonics, (2022) e202200013 doi: [10.1002/tbio.202200013](https://doi.org/10.1002/tbio.202200013)