

Biographical Sketch - David A. Leigh FRS FRSE FRSC MAE (University of Manchester, UK; www.catenane.net)

Education and Employment Summary: David Leigh was born in Birmingham, England, on May 31, 1963. He received his BSc degree in Chemistry in 1984 from the University of Sheffield (UK) followed by a PhD from the same institution in 1987 for his work on crown ether analogues of trichothecenes under the supervision of Dr (now Sir) J. Fraser Stoddart. From 1987-1989 he was a postdoctoral fellow at the National Research Council of Canada in Ottawa, Canada, studying carbohydrate-protein interactions with Prof. David R. Bundle. In 1989 he returned to the UK as a Lecturer (Assistant Professor) at the University of Manchester Institute of Science and Technology (UMIST, since 2004 part of the University of Manchester). He moved to become Professor of Synthetic Chemistry at the University of Warwick (1998-2001) and then Forbes Chair of Organic Chemistry at the University of Edinburgh (2001-2012) before returning to Manchester in 2012 where he is now the Sir Samuel Hall Chair of Chemistry, the only named chair in the Department of Chemistry at the University of Manchester (UK), a historic center for the physical sciences (Dalton, Joule, Rutherford, Bragg, Perkin, Robinson, Haworth, Turing, Geim, etc). Since 2016 Leigh has been a Royal Society Research Professor, a position held by less than 1% of Fellows of the Royal Society, the UK's National Academy of Science and Letters. Leigh is a member of the ACS (since 1987), a Fellow of the Royal Society (FRS), a Fellow of the Royal Society of Edinburgh (FRSE) and a Fellow of the Royal Society of Chemistry (FRSC). Since 2018 he is also a Distinguished Professor at East China Normal University, Shanghai. Leigh was a founding Associate Editor (2010-2018) for *Chemical Science*, the premier journal of the RSC, a founding member (2015-2017) of the editorial advisory board for *ACS Central Science*, and is currently (2014-) a member of the international editorial advisory board for *Angewandte Chemie*.

Research Area: The Leigh group are one of the pioneers of molecular nanotopology (molecular knots and links) and the control of molecular-level dynamics. Landmark examples from Leigh's laboratory include the first synthetic molecular Brownian ratchets (2003), synthetic molecular machines able to perform macroscopic work (2005), the invention of catalytic routes to rotaxanes, catenanes and knots ('active template synthesis'; 2006), and artificial small-molecules that, like motor proteins, 'walk' along tracks (2010). The Leigh group have developed molecular machines having complex mechanisms of operation, including a widely acclaimed synthetic ribosome mimic (2013). In recent years the Leigh group have reported the first examples of autonomous chemically-fuelled molecular motors (2016), used knotting in a molecule to induce allosteric catalysis (2017), synthesized the most complex molecular knots to date (2017, 2018, 2019, 2020), introduced the concept of 'small-molecule robotics' (2016), developed a programmable 'molecular assembler' (2017), and initiated the field of 2D molecular weaving (2020).

Metrics (OrcidID orcid.org/0000-0002-1202-4507; GoogleScholar (GooSch) <https://goo.gl/RFvrGi>): Leigh has authored 310 publications to date, including *Nature* (9), *Science* (7), *Nat. Chem.* (10), *PNAS* (7), *JACS* (68) and *Angew. Chem.* (54). These have accrued >29000 citations, with an h index of 92 (GooSch 1 Feb 2021). More than one-in-four (85) publications have been cited more than 100 times each; six particularly highly-cited primary research papers more than 500 times each. Over the last decade, over half of Leigh publications have been highlighted in the scientific press or wider media. More than thirty (one-in-ten) of Leigh's primary research papers have been the subject of independent published perspectives ('News & Views' articles) by other leading scientists, including: 'Untangling knotty problems' (N&Vs), D. Preston, P. E. Kruger, *Nat. Chem.* **13**, 114–116 (2021) • 'On the right 'track' to artificial assemblers', R. Costil, A. Guinart, B. L. Feringa, *Chem* **6**, 2868–2870 (2020) • 'What tangled webs we weave' (N&Vs), E. E. Fenlon, *Nat. Chem.* **10**, 1078–1079 (2018) • 'A molecular assembler' (N&Vs), T. R. Kelly, M. L. Snapper, *Nature* **549**, 336–337 (2017) • 'Tight embrace in a molecular knot with eight crossings', F. B. L. Cougnon, *Angew. Chem. Int. Ed.* **56**, 4918–4919 (2017) • 'No turning back for motorized molecules' (N&Vs), J. Clayden, *Nature* **534**, 187–188 (2016) • 'Artificial molecular motors: Running on information' (N&Vs), R. D. Astumian, *Nat. Nanotech.* **11**, 582–583 (2016) • 'A chiral catalyst with a ring to it' (N&Vs), S. M. Goldup, *Nat. Chem.* **8**, 404–406 (2016) • 'Molecules bearing robotic arms' (N&Vs), I. Aprahamian, *Nat. Chem.* **8**, 97–99 (2016) • 'Molecular topology: Star-crossed self-assembly' (N&Vs), G. H. Clever, *Nat. Chem.* **6**, 950–952 (2014) •

'Interlocked molecules: A molecular production line' (N&Vs), P. R. McGonigal, J. F. Stoddart, *Nat. Chem.* **5**, 260–262 (2013) •

Public Engagement: Leigh uses a combination of activities that merge art with science (illustrations, video, magic, music, social & traditional media, www, public lectures). In 2018 he commissioned 'Nanobot' [<https://bit.ly/2Qw8qRn>], a video introducing molecular robotics by acapellascience. Social media show the video being used in high schools [<https://bit.ly/36t1nyr>], in university courses [<https://bit.ly/2MXkzg0>], and by teachers, parents, children, teenagers, young adults and the general public. Leigh's molecular 8_{19} knot (*Science* 2017) appears in the Guinness Book of World Records as 'the world's tightest knot'; the molecularly-woven material (*Nature* 2020) is the Guinness World Record 'finest woven fabric'. Leigh is a Director of one of the UK's leading Girls' Schools (Withington Girls' School). He has established a science prize at his alma mater aimed at encouraging girls and financially disadvantaged school children to study science at university.

Honors and Awards: Leigh has received a number of national and international scientific awards, including the Royal Society of Chemistry (RSC) Prizes for Supramolecular Chemistry (2003), Nanotechnology (2005) and the RSC Merck (2009), Tilden (2010), Pedler (2014) and Perkin (2017) Awards, the Spanish Chemical Society (RSEQ) Prize for Chemistry (2007), the Institute of Chemistry of Ireland Award for Chemistry (2005), Feynman Prize for Nanotechnology (2007), the International Izatt-Christensen Award in Macrocyclic Chemistry (2007), the EU Descartes Prize for Transnational Research (2007), the Royal Society Bakerian Medal (2013) and the 2019 ISNSCE (International Society for Nanoscale Science, Computation and Engineering) Nanoscience Prize. He is an honorary member of the Israel Chemical Society, a Clarivate Analytics Highly-Cited Researcher (2018) and is listed in Academic Influence's 'Top Influential Chemists 2010-2020'.

Named & Distinguished Lectures: Daniell Lecture, University College London (2008); Musher Lecture, Hebrew University of Jerusalem (2008); E. Gordon Young Memorial Lectureship, Montreal and Sherbrooke, Canada (2009); Francqui Chair Lectures, University of Louvain-la-Neuve, Belgium (2010); Alex Hopkins Lecture, Cambridge Science Festival (2011); H. Dudley Wright Colloquia, University of Geneva (2012); Sir Robert Robinson Distinguished Lectureship, University of Liverpool (2012); Royal Society Bakerian Lecture (2013); Robert W. Taft Memorial Lecture, UC-Irvine, USA (2013); Sir Gareth Roberts Memorial Lecture, University of Durham (2014); Institute of Creativity Distinguished Visitor Lectures, Hong Kong (2014); TGH Jones Memorial Lecture, Queensland University, Australia (2014); Dewar Lecture, Queen Mary University London (2015); Haworth Lecture, University of Birmingham (2016); Robert Robinson Lectures, University of Oxford (2016); Hugh and Ethel Kelly Lecture, Virginia Tech, USA (2016); Anslyn-Iverson-Sessler Lecture, University of Texas at Austin, USA (2016); Dean's Podium Lecture, Ben Gurion University, Israel (2016); Dalton Lecture, RSC NW Division (2017); Tarrant Distinguished Professorship Lectures, University of Florida, USA (2017); Peiyang Lecture, Tianjin U, China (2018); Xingda Lecture, Peking U, China (2018); Molecular Science Forum Lecture, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China (2018); Xuetang Lecture, Tsinghua U, China (2018); Pollack Lectures, Technion University, Israel (2019); Daedalus Lecture, University of Newcastle (2019); World Distinguished Scholar Forum Lecture, Sun Yat-sen University, Guangzhou, China (2019); The SUSTech Science Lecture, Southern University of Science & Technology, Shenzhen, China (2019); Lu Jiayi Lectureship, Xiamen U, China (2019); Distinguished Lu Jiayi Lecturer, Haixi Institute, Chinese Academy of Sciences, Fujian, China (2019); Coutts Lecturer, Harrow School (2019); Wenkui Forum Lecture, Lanzhou U, China (2019); Zhou Huijiu Forum Lecture, Xi'an Jiaotong University, China (2019); Qujiang Forum Lecture, Shangxi Normal University, China (2019); Zhongjian Yang Lecture, Xi'an Northwest University, China (2019); Timothy J. O'Leary Distinguished Scientist Lectures, Gonzaga University, USA (2020); Joshua Jortner Distinguished Lectures in Chemistry, Tel Aviv, Israel (2020); Newlands Lecture, Imperial College London (2021); Lansdowne Lecturer, University of Victoria, Canada (2022).