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Biographical Information

Stephen holds a B.Eng in Electronic Engineering from DCU and a PhD from DCU earned while studying abroad at IMEC, Belgium and Philips Research, The Netherlands. He spent 8 years with Applied Materials, where he held a number of senior positions including Metallisation Technologist for Northern Europe and Global Cluster Team Manager. Following this he spent 3 years with Scientific Systems Ltd as Head of Research and Development, developing and marketing their flagship plasma process control product. He spent 1 year at University College Dublin as Manager of the Centre for Materials Processing. In March 2004, he joined the Dept. of Electronic Engineering, DCU and in July 2005 was appointed Executive Director of the National Centre for Plasma Science and Technology.

His primary scientific technical competence is in the area of integrated circuit manufacturing processes and novel thin film deposition techniques. He also has extensive experience in team management, and product design and development. He has spent time working at Philips Research, IMEC and the Applied Materials laboratories in California, and maintains significant national and international linkages within the broader plasma and semiconductor processing industry.

He was appointed the Irish Representative on the European Joint Committee on Plasma and Ion Surface Engineering (2005) and is a member of the IEEE.

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Research Interests

- Processes for the fabrication of novel blue-UV electroluminescent devices
- Advanced plasma process control, measurement and diagnostics for IC manufacturing.
- Surface engineering and fabrication of miniaturised medical devices

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Contact Information

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Current Research Projects

- Principal Investigator, ‘Non-Invasive Magnetron Sputtering Target and Process Conditioning Monitor’, Awarded € 88,857 under the Enterprise Ireland Proof of Concept 2005
 - Collaborator with Prof. Patrick McNally, ‘White Light Flexible Polymer Displays Based on Copper Halide Nanoparticle Electroluminescence’, Awarded € 89,987 under the Enterprise Ireland POC 2005 (Summer)
- Researcher, Centre for Future Health and Diagnostics, SFI CSET, 2005
- Principal Investigator, Plasma Etching for desired nano-Feature shape and nano-texture: An Advanced Reactor and Simulation Software for Feedback-Loop Plasma Control, Awarded € 300,000 FP6 Specific Targeted Research Project 2005 – 2008
- Advanced Plasma Sensors for Virtual Metrology, Funding from Industrial Partner – Intel
- Analysis of the Impact of Lens Degradation on Photolithography Capability for IC Manufacturing, Funding from Industrial Partner – Intel
- Development of Next Generation Plasma Process Endpoint, Funding from Industrial Partner – Lexas Research

Recent Projects and Active Interests

- Plasma enhanced chemical vapor deposition of oxide-based coatings for biomedical device applications
- Sterilisation methods for pre-treatment of hospital water systems for the eradication of microbial contamination
- Measurement and Control of Atmospheric Plasmas

Commercial Interests

- o Founder and Director of Qualflow Systems Ltd, a technology company providing sterilization solutions to the food industry
- o Founder of Lexas Research, a technology company providing process control and diagnostic systems to the semiconductor industry
- o Winner, Mallin Invent Award, (Lexas Research), 2005
- o Runner-Up, Mallin Invent Award, (Qualflow Systems), 2004

Research Team

Primary Academic Collaborator: Prof. Patrick McNally

PhD/MEng Candidates

Gomathi Natarajan (School of EE/NCPST)

[Ram Prasad](#)¹¹ (School of EE/NCPST)

David Kavanagh (School of EE/NCPST)

Niall MacGearailt (Intel)

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11. <http://www.eeng.dcu.ie/%7Enano/RP.htm>

Rajesh Joshi (Intel)

Research Fellows, Visiting Researchers & Industrial Partners

Dr. Victor Law, NCPST

Niall MacGearailt (Intel)

Rajesh Joshi (Intel)

Dr. Justin Lawler (Qualflow Systems)

Dr. Felipe Soberon (Lexas Research)

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List of Publications

Refereed Journal Publications

1. V J Law, S Daniels J F Lalor and S J Wooley, Passive Radio Spectroscopy of an Atmospheric Plasma, *Electronic Letters*, June 2006, Vol. 42, No. 12
2. A. Mitra, L. O'Reilly, O.F. Lucas, G. Natarajan, A.L. Bradley, P.J. McNally, S. Daniels, D.C. Cameron, A. Reader, and M. Martinez-Rosas, CuCl films on silicon substrates: toward optoelectronic devices, *J. Lumin.* – on revision
3. G. Natarajan, S. Daniels, D. C. Cameron, L. O'Reilly, P. J. McNally, O. Lucas, I. Reid, R T Rajendra Kumar, A. Mitra, A. L. Bradley Growth of CuCl thin films by RF magnetron sputtering for UV optoelectronic applications, Submitted for publication to *J. Appl. Phys.* – accepted
4. B. Kolodziejczyk, A. R. Ellingboe, S. M. Daniels, L. Oksuz, M. Oubaha, H. Barry, R. Copperwhite, K. O'Dwyer, and B. D. MacCraith, Effects of Ar and O₂ additives on photopatternable sol-gel etching in an SF₆-based plasma for planar lightwave circuit fabrication, Submitted for publication to *Microelectronic Engineering* 2006
5. L. O'Reilly, A. Mitra, G. Natarajan, O. F. Lucas, P. J. McNally, S. Daniels, D. C. Cameron, A. L. Bradley, A. Reader, 'Impact on structural, optical and electrical properties of CuCl by incorporation of Zn for n-type doping, *J. Cryst. Growth* – 28, 112-117 (2006)
6. O. F. Lucas, L. O'Reilly, G. Natarajan, P.J. McNally, S. Daniels, D.M. Taylor, S. William, D.C. Cameron, A. L. Bradley, A. Mitra, Encapsulation of the heteroepitaxial growth of wide Bandgap CuCl on Silicon Substrates, *J. Cryst. Growth* – 287, 139 (2006), and Presented at International Conference for Materials for Advanced Technologies.
7. L. O'Reilly, G. Natarajan, O.F. Lucas, P.J. McNally, S. Daniels, D.C. Cameron, A. Reader, A. Mitra, M. Martinez-Rosas and A. L. Bradley, Room temperature ultra-violet electroluminescence from a cubic semiconductor grown on near lattice-matched silicon, accepted for publication in *J. Appl. Phys.* 98, 113512 (2005)
8. F. T. O'Neill, A. J. Carr, S. M. Daniels, M. R. Gleeson, J. V. Kelly, J. R. Lawrence, J. T. Sheridan "Refractive elements produced in photopolymer layers", *Journal of Materials Science* 40 (2005) 4129 - 4132
9. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, E. Tully, R. O'Kennedy, Adhesion Improvement of Plasma Polymerized HMDSO Films on Medical Grade Stainless Steel by Plasma Pretreatment and Layering, *Plasma Polymers and Related Materials*, Eds. M.Mutlu, G Dinescu, R Förch, J M Martin-Martinez and J Vyskocil, Hacettepe, University Press 2005, ISBN 975-491-194-0, pp. 115-124
10. L. O'Reilly, G. Natarajan, P.J. McNally, D.C. Cameron, O. F. Lucas, M. Martinez-Rosas, A. L. Bradley, A. Reader, S. Daniels, Growth and characterisation of wide-bandgap, I-VII optoelectronic materials on silicon, *Journal of Materials Science: Materials in Electronics* 16 (2005) 415 – 419

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11. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, E. Tully, R. O'Kennedy, PECVD of Biocompatible Coatings on 316L Stainless Steel, to be published in *Surface and Coatings Technol.* (2005)
12. S. Daniels, R.A.M. Wolters, J. van Zijl and J. Schildermans, Ti/TiN/Ti(N) PVD liners for W-plug applications, *Microelectronic Engineering* (50)1-4 (2000) pp. 271-276
13. G. P. Beyer, K. Maex, S. Daniels, S. Lee, J. Proost, H. Bender, M. Judelewicz, N. Maity, Al Speed Fill, *Materials Science in Semiconductor Processing* 2 (1999) pages 75 – 82
14. S. Daniels, D. C. Cameron, Examination of Thin Film Uniformity at the Bottom of a Hole Structure Using a 3D Sputter Simulation Package, *J. Phys. III France* 6 (1996) pp. 1213 – 1218
15. P. V. Kola, S. Daniels, D. C. Cameron, M. S. J. Hashmi, Magnetron Sputtering of TiN Protective Coatings, *Journal of Materials Processing Technology*, 1993

Published Conference Proceedings

1. G. Natarajan, L. O'Reilly, S. Daniels, D. C. Cameron, P. J. McNally, O. Lucas, A. Reader, A. Mitra, L. Bradley, Structural and Optoelectronic Properties of Sputtered Copper (I) Chloride, *Proc. SPIE Int. Soc. Opt Eng.* 5825, 364 (2005), Dublin Ireland, 4 – 6 April 2005
2. L. O'Reilly, G. Natarajan, P.J. McNally, S. Daniels, O.F. Lucas, A. Mitra, M. Martinez-Rosas and A. L. Bradley, The use of wide-bandgap CuCl on silicon for ultra-violet photonics, *Proc. SPIE Int. Soc. Opt Eng.* 5825, 29 (2005), Dublin Ireland, 4 – 6 April 2005
3. Feidhlim T. O'Neill, Alun J. Carr, Stephen M. Daniels, Michael R. Gleeson, John V. Kelly¹, Justin R. Lawrence⁴, John T. Sheridan¹, "Photo-embossed optical elements and microfluidic lens fabrication", *Proc. SPIE Int. Soc. Opt Eng.* 5825,(2005), Dublin Ireland, 4 – 6 April 2005
4. Optoelectronic Properties of RF Sputtered CuCl Thin Films, Gomathi Natarajan¹, Anirban Mitra², Lisa O'Reilly¹, Stephen Daniels¹, David C. Cameron³, Patrick J. McNally¹, Olabanji Lucas¹, Louise Bradley², *Mater. Res. Soc. Symp. Proc.*, Vol. 891, 0891-EE03-22.1, Boston USA, 28 Nov – 2 Dec, 2005
5. S. Daniels, J. Ryder, P. T. Connolly, E. Ahearne, D. Hughes, Design, Validation and Optimisation of a Production Process Flow using a Discrete Event Simulation Package, *Proceedings of the International Manufacturing Conference*, Cork 2002
6. G. P. Beyer, K. Maex, S. Daniels, N. Maity, D. Bassanini, IMP Liners for Al Via Speed Fill, *Proceedings of the Advanced Metallisation Conference*, Colorado Springs 1998, Materials Research Society, Warrendale, PA (1999) 433
7. S. Daniels, D. C. Cameron, Monte Carlo Simulation of Particle Fluxes in the Magnetron Sputtering Process, *Proc. of Advances in Materials and Processing Technologies*, August 1995, pages 953 – 958

Presented Papers

1. Invited Talk - Biocompatible Coatings with Silicon and Titanium Oxides Deposited by PECVD, G. R. Prasad, S. Daniels, D. C. Cameron, E. Tully, R. O'Kennedy, 3rd Mikkeli International Industrial Coating Seminar, Mikkeli, Finland, March 2006
2. O. F. Lucas, L. O'Reilly, G. Natarajan, P.J. McNally, S. Daniels, D.M. Taylor, S. William, D.C. Cameron, A. L. Bradley, A. Mitra, Encapsulation of the heteroepitaxial growth of wide Bandgap CuCl on Silicon Substrates, Presented at the 3rd International Conference on Advanced Materials (ICMAT), Singapore, 3-8 July 2005.
3. L. O'Reilly, G. Natarajan, O. F. Lucas, P. J. McNally, S. Daniels, A. Mitra, L. Bradley, D. C. Cameron, A. Reader, Ultra-violet electroluminescence using wide-bandgap CuCl on silicon, Presented at the 3rd International Conference on Advanced Materials (ICMAT), Singapore, 3-8 July 2005.

4. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, E. Tully, R. O’Kennedy, Adhesion Improvement of Plasma Polymerized HMDSO Films on Medical Grade Stainless Steel by Plasma Pretreatment and Layering, Presented at the International Workshop on Plasma Polymers and Related Materials, Oct 2004, Antalya, Turkey
5. G. Natarajan, S. Daniels, D. C. Cameron, L. O’Reilly, P. McNally, Plasma Diagnostics for the RF Physical Vapour Deposition of CuCl Thin Films, Presented at the 57th Gaseous Electronics Conference, September 2004, Ireland
6. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, E. Tully, R. O’Kennedy, Effect of Plasma Pretreatment on the Adhesion of Biocompatible Films on 316L Stainless Steel Deposited by Plasma Enhanced Chemical Vapour Deposition of HMDSO, Presented at the 57th Gaseous Electronics Conference, September 2004, Ireland
7. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, E. Tully, R. O’Kennedy, PECVD of Biocompatible Coatings on 316L Stainless Steel, Presented at the 9th International Conference on Plasma Surface Engineering, Sept 2004, Garmisch-Partenkirchen, Germany
8. M. MacDonnell, S. Daniels, Managing Critical Issues for First Stage Technology Start-Ups Involved in Joint Development Projects, Presented at the Annual Conference of the Irish Management Academy, Trinity College Dublin, September 2004
9. G. R. Prasad, S. Daniels, D. C. Cameron, B. P. McNamara, Influence of deposition parameters on the surface properties of plasma polymerized hexamethyldisiloxane films, Presented at the 15th Annual Conference of the Irish Plasma and Beam Processing Group, Dublin City University June 2004

Patents

1. US Patent 6,441,620,B1 'Method for Fault Identification in a Plasma Process', Aug 29th, 2002
2. Single actuator automated FOB detector for beverage dispense systems, Justin F. Lawler, Michael Hopkins, Ciaran O’Morain, Stephen Daniels, filed Dec 2005
3. Method for measuring the behaviour of a DC plasma system, Stephen Daniels, Justin Lawler, Victor Law, (in filing process)

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