

Darran Robert Cairns

Personal Details

Work

Tailored Surfaces,
Morgantown, WV, 26505
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Home

1608 SE 2nd Terrace,
Lee's Summit, MO, 64063

Education

1999 **PhD Materials Science**

University of Birmingham, Edgbaston, Birmingham, United Kingdom

1995 **BSc Physics**

University of Birmingham, Edgbaston, Birmingham, United Kingdom

Research Experience

2014-Present **CEO and Founder**

Tailored Surfaces, Morgantown, WV, USA

- Solution based processing of smart materials.
- Micro and nano-composite materials.
- Liquid crystalline materials and composites.
- Flexible Laminate Electronics.
- Sensors and Touch Screens.
- Display Materials and Optical Components.

2006-Present **Associate Professor in Mechanical Engineering**

(Adjunct Associate Professor since August 2014)

West Virginia University, Mechanical & Aerospace, Morgantown, WV, USA

- Solution based processing of composite materials.
- Micro and nano-composite materials.
- Liquid crystalline materials and composites.
- Flexible Laminate Electronics.
- Sensors and Touch Screens
- Display and Lighting Materials.

2001-2005 **Research Specialist**

3M Touch Systems, Optical Systems Division, Methuen, MA, USA

- Touch Sensors
- High performance coatings for mechanical protection of displays and touch sensors
- Metallization of organic and inorganic transparent conducting films
- Development of wear resistant composite sol-gel optical coatings
- Degradation mechanisms of functional materials
- Processing-structure-properties relations of transparent conducting films
- High performance Pb-free nanoparticle based thick film ceramics.
- Micro-composite based adhesive systems for solder replacement.

1998-2001 **Postdoctoral Research Associate in Engineering**

Brown University, Division of Engineering, Providence, RI, USA

- Opto-mechanical properties of organic functional materials
- Electrical and mechanical properties of functional transparent conducting materials on polymers for flexible device applications
- Fabrication and characterization of organic passive optical components for information displays

- Self-assembled electro-optical meso-structures from reactive liquid crystal monomers
- Fabrication and characterization of strain sensors from liquid crystal-polymer composites
- Flexible and conformable information displays
- Physical aging of liquid crystalline materials

1995-1998 **Graduate Student in Metallurgy & Materials**
University of Birmingham, Edgbaston, Birmingham, UK

- Dissertation title "The mechanical reliability of silica optical fibres"
- Experimental and statistical analysis of mechanical failure of optical fibres in aqueous environments. Sponsored by Pirelli Cables UK Ltd.

Teaching Experience

1999-2005 **Adjunct Assistant Professor in Engineering**
Brown University, Division of Engineering, Providence, RI, USA

- Course title: Structure and Properties of Non-Metallic Materials
- Full responsibility for course development
- Upper level class primarily Seniors and Graduate Students

2000 **Adjunct Assistant Professor in Physics**
University of Massachusetts, Department of Physics, Dartmouth, MA, USA

- Course title: 2nd Semester Physics (Electric Circuits and Electromagnetism) for modern physics program
- Studio based teaching approach with all teaching performed in the laboratory

1995-1998 **Teaching Assistant in Mathematics and Engineering**
University of Birmingham, Edgbaston, Birmingham, UK

- TA for Department of Mathematics engineering mathematics courses
- Laboratory demonstrator for numerical and computational methods course including development of laboratory assignments
- Laboratory demonstrator for polymer processing laboratory
- TA for composite beam design experiment

Prior Consultancies

Apple Inc. and Anor. v. Samsung Electronics Co. Ltd. and Anor. NSD 1243 of 2011 (Federal Court of Australia, New South Wales, Australia).

Retained as independent expert witness by Freehills acting on behalf of Apple Inc. and Anor. to provide independent expert advice on touch-screen technology. Prepared expert reports and gave oral testimony at trial.

Apple Inc. v. Samsung Electronics Co., 5:11-CV-01846-LHK, U.S. District Court, Northern District of California (San Jose).

Retained as an expert consultant by Bridges Mavrakakis LLP acting on behalf of Apple Inc. to provide expert advice on touch-screen technology.

Apple Inc. v. HTC Corp., ITC Inv. No. 337-TA-797 US International Trade Commission (Washington DC). Retained as an expert consultant by

Feinberg Day Alberti & Thompson LLP acting on behalf of Apple Inc. to provide expert advice on touch-screen technology. Prepared expert reports, provided deposition testimony and oral testimony at trial.

Intellectual Ventures I LLC. and Intellectual Ventures II LLC v. Motorola Mobility inc., 1:11-cv-00908-UNA, U.S. District Court, Delaware. Retained as an expert consultant by Feinberg Day Alberti & Thompson LLP acting on behalf of Intellectual Ventures I LLC and Intellectual Ventures II LLC to provide expert advice on portable displays. Prepared expert reports and deposition testimony.

TPK Touch Solutions Inc. v. Wintek Electro-Optics Corporation., 3:2013-cv-02218, U.S. District Court, California Northern District. Retained as an expert consultant by White and Case LLP acting on behalf of TPK Touch Solutions Inc. to provide expert advice on touch sensors and touch sensor fabrication.

Tallahassee Communications Industries, Inc. v. Avnet Inc., DC-11-04062, U.S. District Court, Dallas. Retained as an expert consultant by Gardere Wynne Sewell LLP acting on behalf of Avnet Inc. to provide expert advice on touch sensors.

Fiteq Inc. v. Venture Corporation et al., 5:13-cv-01946, U.S. District Court, California Northern District. Retained as an expert consultant by Snell and Wilmer LLP acting on behalf of Venture Corporation et al. to provide expert advice on the fabrication of powered flexible smart cards.

Sources of Compensation in Areas of Expertise

DLA Piper, Freehills, Feinberg Day, Bridges Mavrakakis, National Science Foundation, Portuguese Ministry of Science, State of Virginia, Arkema, Morrison and Foerster, McKinsey Corporation, The University of Birmingham, West Virginia University, Gardere Wynne Sewell, White and Case LLP, Snell and Wilmer.

Sources of Grant Funding in Areas of Expertise

National Science Foundation, NASA, West Virginia Higher Education Policy Commission, Solutia, Grote Industries, EuropTec USA, West Virginia University, Kopp Glass.

Supervisory Experience

	Research Engineer
2002-2003	Aaron Kessman, 3M Touch Systems (Supervisor) Fabrication and characterization of thin film touch sensors
	Technicians
2005	Mauricio Lopez, 3M Touch Systems (Supervisor) Pb free nanocomposite thick films
2005	Scott Driscoll, 3M Touch Systems (Supervisor) Mechanical properties of Pb free electrical interconnects
	3M Summer Undergraduate Research Program
2005	Lisa Jog, MSE, Brown University (Supervisor) Pb free nanocomposite thick films
2004	Jason Rich, ChemE, Cornell University (Supervisor) Processing/mechanical property relationships for sol-gel derived silica nanocomposites

2008-2012 **Research Assistant Professors Supervised**
 Dr. Kostas Sierros
 Polymer materials for energy utilization

PostDoctoral Scholars Supervised

2006-2008 Dr. Karpagavalli Ramji
 Corrosion resistance of ceramic films

2007-2008 Dr. Kostas Sierros
 Polymer materials for energy utilization

PhD Students

2010 (Award) Brice Gnahore, AE, West Virginia University, Mechanical
 Properties of Aerogels

2011 (Award) Aaron Kessman, ME, West Virginia University,
 Mesostructured sol-gel coatings
NSF Fellowship and NDSEG Fellowship

2009-Present Teddi Bejital, ME, West Virginia University, Degradation of
 Flexible Conductors

2009-2012 Nicholas Morris, ME, West Virginia University, Dynamic
 Roughness Films
NSF Fellowship

2011-Present Derrick Banerjee, ME, West Virginia University
 Nanoindentation of Oleophobic Films
Ruby Fellowship

MS Students

2008 (Award) Matthew Shafran, ME, West Virginia University
 Stimulus responsive polymer nanostructures

2010 (Award) Rignesh Desai, ME, West Virginia University
 TiO₂ coatings for biomedical applications

2010 (Award) Sarah Smith, AE, West Virginia University
 Responsive polymer surfaces for aerodynamic flow control

2007-Present Darren Huckaby, ME, West Virginia University
 Oleophobic sol-gel coatings

2012 (Award) Elizabeth DeFusco, ME, West Virginia University
 Tribological coatings

2011-Present Edward Chambers, ME, West Virginia University
 Surface and Interfaces in Flexible LED laminates
NSF Fellowship

2011-2012	Sean Cronin, ME, West Virginia University Corrosion of Solar Reflectors
2012-Present	Andrew Hoover, ME, West Virginia University Tribology of Zip-Lines and Cables

Undergraduate Students

2010-2011	Andrew Hoover, ME, West Virginia University Mechanical behaviour of flexible conductors
2008-2010	Derick Banerjee, ME, West Virginia University Nanoindentation of ITO Films
2008-2011	Sean Cronin, MAE, West Virginia University Corrosion of Solar Reflectors
2008-2010	Sarah Zimmerman, ME, West Virginia University Tribology of Functional Films
2008-2010	Corey Snyder, MAE, West Virginia University Wear of ITO Films
2008-2010	Ondra Karas, AE, West Virginia University Flexible Solid State Lighting
2007-2009	Nick Morris, ME, West Virginia University Stress-corrosion of ITO films
2006-2009	Phil Evans, MAE, West Virginia University Speckle of anti-glare surfaces
2007-2008	Ryan Nutter, MAE, West Virginia University Spray coating of sol-gel films
2006-2007	John Brewer, ME, West Virginia University Aging of alkoxide sols
2006-2007	Nick Hansford, AE, West Virginia University Aggregation of nanoparticles
2002-2003	Suraj Gorkhali, EE, Brown University (thesis reader) Flexible and conformable displays
2000	Lara Oliver, EE, Brown University (day-to-day supervision) Flexible Display Materials
2000	Vicki Shier, EE, Brown University (day-to-day supervision) Flexible Displays Materials
1999	Suzanne Sachsman, EE, Brown University (day-to-day supervision) Flexible Display Materials
1999	Richard Witte, MSE, UIUC (day-to-day supervision)

Flexible Displays Materials

1999 Dan Sparacin, MSE, Brown University (day-to-day supervision)
Flexible Displays Materials

1998 Sharon Pang, MSE, University of Birmingham (day-to-day supervision)
Optical Fibers

Educational Outreach

1998-2001 **Postdoctoral Research Associate in Engineering**
Brown University, MRSEC, Providence, RI, USA

- Developed course materials for MRSEC educational outreach activities
- Instructor in MRSEC educational outreach to youth groups including Providence Boys and Girls Club and the Providence Bridge School
- Instructor in Brown Universities MRSEC Educational Institute for high school science teachers
- Day-to-day supervision of seven undergraduate students as part of Brown Universities summer research experience program for undergraduates

Achievements

Winner Weaver Award for Excellence in Mechanics Education at WVU 2008
Paper selected for Best Papers of Society for Information Display 2003
Visiting Assistant Professor in Engineering Brown University 2003-04
University of Birmingham Honorary Research Fellow in Engineering 2002-05
(promoted to Honorary Senior Research Fellow Jan 1st 2006)
Chapter Chair of New England Chapter of The Society for Information Display
Co-inventor of 9 issued US Patents
Regional Winner Institute of Materials National Lecture Competition 1998
University of Birmingham Postgraduate Faculty Student Liaison Committee
Pirelli Cables Graduate Student Fellowship 1995-1998
Plenary Speaker, NordTrib, Lulea, Sweden, June 2010

Professional Service

Editor of two Special Sections of the Journal of the SID on 3D Displays and Interactive Displays
Chapter Chair of New England Chapter of The Society for Information Display
Program Committee Member Society for Information Display International Symposium (2004 – 2007)
Program Committee Member International Display Research Conference 2006
Reviewer for Thin Solid Films, Surface Coatings and Technology, Materials Science Letters, Smart Materials and Structures and The Journal of the SID.
Supported Economic Development through Product Development Projects with Grote, CP Films (now Solutia) and EuropTec USA.
Classroom Instruction in Physics at Fairmont Senior High School
Director of NSF RET Site in Energy and the Environment

Learned Societies

Institute of Physics, CPhys, MInstP
Society for Information Display
American Society for Engineering Education
American Society of Mechanical Engineers
West Virginia Science Teachers Association

Publications

Underlined signifies undergraduate student researcher.

Journal

- [J45] D. A. Banerjee, A. J. Kessman, D. R. Cairns, K. A. Sierros, "Tribology of silica nanoparticle-reinforced, hydrophobic sol-gel composite coatings" *Surface Coatings and Technology* **260** p215 (2014)
- [J44] G. Kiriakidis, I. Kortidis, S. Cronin, N. J. Morris, D. R. Cairns, K. A. Sierros, "Tribological investigation of piezoelectric ZnO films for rolling contact based energy harvesting and sensing applications" *Thin Solid Films* **555** p68 (2014)
- [J43] T. S. Bejital, N. J. Morris, D. R. Cairns, K. A. Sierros, "Controlled buckling behavior of patterned oxide structures on compliant substrates for flexible electronics" *Thin Solid Films* **549** p268 (2013)
- [J42] T. S. Bejital, N. J. Morris, S. D. Cronin, D. R. Cairns, K. A. Sierros, "Mechano-chemical degradation of flexible electrodes for optoelectronic device applications" *Thin Solid Films* **549** p251 (2013)
- [J41] T. S. Bejital, D. Compton, K. A. Sierros, D. R. Cairns and S. N. Kukureka, "Electromechanical reliability of flexible transparent electrodes during and after exposure to acrylic acid" *Thin Solid Films* **528** p229 (2013).
- [J40] G. A. Potoczny, T. S. Bejital, J. S. Abell, K. A. Sierros, D. R. Cairns and S. N. Kukureka "Flexibility and electrical stability of polyester-based device electrodes under monotonic and cyclic buckling conditions", *Thin Solid Films* **528** p205 (2013).
- [J39] A. J. Kessman, E. Defusco, A. W. Hoover, K. A. Sierros and D. R. Cairns, "Structural, mechanical, and tribological properties of silica films with encapsulated hydrophobic functionality: effect of functional moiety and surfactant template concentrations", *Thin Solid Films* **520** p3896 (2012).
- [J38] A. J. Kessman, E. DeFusco, A. W. Hoover, K. A. Sierros, D. R. Cairns, "Sustained Protection for Transparent Electrodes in Touch Panels and Smart Windows: Template Assisted Encapsulation of Fluorinated Silanes in Sol-Gel Silica Films for Sustained Hydrophobic-Oleophobic Functionality" *Materials Research Society Symposium Proceedings* **1400** (2012).
- [J37] T. S. Bejital, K. Ramji, A. J. Kessman, K. A. Sierros and D. R. Cairns, "Degradation of an amorphous indium tin oxide film in acrylic acid", *Materials Chemistry and Physics* **132** p395 (2012).
- [J36] J M Gutiérrez, E J Barbero, D R Cairns, V H Mucino and J A Mayugo, "Dynamic roughness and power dissipation of polymer films actuated with liquid crystal polymer inclusions", *Smart Materials and Structures* **21** p015003 (2012).
- [J35] K. A. Sierros, T. S. Bejital, S. Cronin, A. J. Kessman, S. N. Kukureka and D. R. Cairns, "Tribo-corrosion of Ag and Ag-alloy ITO multilayers used in solar energy applications", *Wear* **271** p438 (2011).
- [J34] A. J. Kessman, S. N. Kukureka and D. R. Cairns, "Tribology of fluorinated mesoporous silica films", *Wear* **271** p2144 (2011).

- [J33] A. J. Kessman and D. R. Cairns, "Template-assisted encapsulation of fluorinated silanes in silica films for sustained hydrophobic-oleophobic functionality", *Journal of Colloid and Interface Science*, **360** p785 (2011).
- [J32] K. A. Sierros, N. J. Morris, R. Nair, N. X. Randall, and D. R. Cairns, "Spherical indentation and scratch durability studies of transparent conducting layers on polymer substrates", *Thin Solid Films*, **520** p424 (2011).
- [J31] A. J. Kessman and D. R. Cairns, "Microtribological study of internal surfaces of fluorinated mesoporous silica films", *Langmuir*, **27** p5968 (2011).
- [J30] D. S. Hecht, K. A. Sierros, L. Hu, C. Niu, R. S Lee, D. A. Banerjee and D. R. Cairns, "Transparent conductive carbon nanotube films directly coated onto flexible and rigid polycarbonate", *Journal of the Society for Information Display* **19** p157 (2011).
- [J29] K. A. Sierros, D. A. Banerjee, N. J. Morris, D. R. Cairns, I. Kortidis and G. Kiriakidis, "Mechanical properties of ZnO thin films deposited on polyester substrates used in flexible device applications", *Thin Solid Films* **519** p325 (2010).
- [J28] D. R. Cairns, M. S. Shafran, K. A. Sierros, W. W. Huebsch, A. J. Kessman, "Stimulus-responsive fluidic dispersions of rod shaped liquid-crystal polymer colloids", *Materials Letters* **10** p1133 (2010).
- [J27] K. A. Sierros, D. S. Hecht, D. A. Banerjee, N. J. Morris, L. Hu, G. C. Irvin, R. S Lee and D. R. Cairns, "Durable transparent carbon nanotube films for flexible device components" *Thin Solid Films* **518** p6977 (2010).
- [J26] K. A. Sierros, D. R. Cairns, J. S. Abell and S. N. Kukureka, "Pulsed laser deposition of indium tin oxide films on flexible polyethylene naphthalate display substrates at room temperature" *Thin Solid Films* **518** p2623 (2010).
- [J25] A. J. Kessman, D. R. Cairns, P. J. Richter, F. J. Bottari, "Mesostructured island formation in sol-gel SiO₂ films through controlled, concentration-dependent flocculation of colloidal silica particles", *Materials Letters* **64**, p258 (2010).
- [J24] A. J. Kessman, K. Ramji, N. J. Morris, D. R. Cairns, "Zirconia sol-gel coatings on alumina-silica refractory material for improved corrosion resistance" *Surface and Coatings Technology* **204**, p477 (2009).
- [J23] K. A. Sierros, N. J. Morris, K. Ramji and D. R. Cairns, "Stress-corrosion cracking of indium tin oxide coated polyethylene terephthalate for flexible optoelectronic devices", *Thin Solid Films* **517**, p2590 (2009).
- [J22] A. J. Kessman, D. K. P. Huckaby, C. R. Snyder, S. N. Kukureka and D. R. Cairns, "Tribology of water and oil repellent sol-gel coatings for optical applications", *Wear* **267**, p614 (2009).
- [J21] K. A. Sierros, N. J. Morris, S. N. Kukureka and D. R. Cairns, "Dry and wet sliding wear of ITO coated PET components used in flexible optoelectronic applications", *Wear* **267**, p625 (2009).
- [J20] M. Shafran, K. A. Sierros, W. W. Huebsch, D. R. Cairns, "Electrically switchable liquid crystal polymer rod actuators" *Materials Research Society Symposium Proceedings*, 1096, FF03-07 (2008).

- [J19] K. A. Sierros, N. J. Morris, J. S. Abell, D. R. Cairns, S. N. Kukureka, "Mechanical integrity of hybrid components used in flexible optoelectronic devices", Materials Research Society Symposium Proceedings, 1075, J04-04 (2008)
- [J18] D. R. Cairns, P. J. Richter, A. J. Kessman, F. J. Bottari and N. X. Randall, "Mechanical and tribological investigations of sol-gel derived SiO₂ optical coatings", Wear **265**, p411 (2008).
- [J17] K. Ramji, D. R. Cairns & S. Rajeswari "Synergistic inhibition effect of 2-mercaptobenzothiazole and Tween-80 on the corrosion of brass in NaCl solution", Applied Surface Science **254**, p4483 (2008).
- [J16] D. R. Cairns, "Introduction: Special Section on 3-D Displays" J. Soc. Inf. Display **15**, p859 (2007).
- [J15] D. R. Cairns and G. P. Crawford, "Electro-mechanical properties of transparent conducting substrates for flexible electronic displays", Proceedings of the IEEE, **93**, p1451 (2005).
- [J14] M. J. Escuti, D. R. Cairns and G. P. Crawford, "Optical-strain characteristics of anisotropic polymer films fabricated from a liquid crystal diacrylate" Journal of Applied Physics **95**, p2386 (2004).
- [J13] S. P. Gorkhali, D. R. Cairns and G. P. Crawford, "Flexible transparent conducting substrates for rollable displays: a cyclic loading study", Journal of the Society for Information Display **12**, p45 (2004).
- [J12] D. R. Cairns, S. P. Gorkhali, S. Esmailzadeh, J. Vedrine, and G. P. Crawford, "Conformable displays based on Polymer Dispersed Liquid Crystal Materials on Flexible Substrates", Journal of the Society of Information Display, **11**, p289 (2003).
- [J11] D. R. Cairns, M. Sibulkin and G. P. Crawford, "Switching dynamics of suspended mesogenic polymer microspheres" Applied Physics Letters, **78**, p2643 (2001).
- [J10] D. R. Cairns, D. C. Paine and G. P. Crawford, "The mechanical reliability of indium tin oxide coated polymer substrates for flexible displays and touchscreens" MRS proceedings, 666, F3.24.1-F3.24.12 (2001).
- [J9] N. A. Bailey, D. R. Cairns, G. P. Crawford, and J. N. Hay "A study of enthalpic relaxation of a Liquid Crystal " Liquid Crystals, **28**, p1761 (2001).
- [J8] S. N. Kukureka, A. Pedicini and D. R. Cairns, "Embedded fiber-optic sensors: performance aspects and the single-fiber fragmentation test" Proceedings of SPIE Vol 4215, p 218-224 (2001).
- [J7] S. N. Kukureka and D. R. Cairns, "A comparison of the distribution of estimated weibull parameters from optical fiber strength measurements", Proceedings of SPIE Vol 4215, p 90-97 (2001).
- [J6] D. R. Cairns, S. M. Sachsman, D. K. Sparacin, R. P. Witte II, G. P. Crawford and D. C. Paine "Mechanical behavior of indium oxide thin films on polymer substrates" in Thin Films VIII–Stresses and Mechanical Properties, Editors R. Vinci, O. Kraft, N. Moody, P. Besser and E. Shaffer II, p401 (2000).

- [J5] D. R. Cairns, N. S. Eichenlaub and G. P. Crawford, "Ordered polymer microstructures synthesized from dispersions of liquid crystal mesogens", *Molecular Crystals and Liquid Crystals*, **351**, p379 (2000).
- [J4] D. R. Cairns, C. C. Bowley, S. Danworaphong, A. K. Fontecchio and G. P. Crawford, "Optical Strain Characteristics of Holographically-Formed Polymer-Dispersed Liquid Crystal Films" *Applied Physics Letters* **77**, p2677 (2000).
- [J3] D. R. Cairns, R. P. Witte II, D. K. Sparacin, S. M. Sachsman, D. C. Paine, G. P. Crawford and R. R. Newton "Strain-dependent electrical resistance of tin doped indium oxide on polymer substrates" *Applied Physics Letters*, **76**, p1425 (2000).
- [J2] S. N. Kukureka and D. R. Cairns, "Statistical analysis methods for strength distributions in optical fibres", in *Optical Fiber Reliability and Testing*, M John Matthewson, Editor, Proceedings of SPIE Vol 3848, p 17 (1999).
- [J1] D. R. Cairns, G. M. Genin, A. J. Wagoner, C. L. Briant and G. P. Crawford, "Amplified strain-rate dependence of deformation in Polymer Dispersed Liquid Crystal materials", *Applied Physics Letters*, **75**, p1872 (1999).

Books and Book Chapters

- [B1] G. P. Crawford and D. R. Cairns, Eds., "Flexible Flat Panel Displays", 2nd Edition, Wiley (in preparation – to be published 2016)
- [BC2] D. R. Cairns, M. E. Sousa and G. P. Crawford, "Responsive Reactive Mesogen Microstructures", in *Crosslinked Liquid Crystalline Systems: From Rigid Polymer Networks to Elastomers*, D. J. Broer, G.P. Crawford, and S. Zumer, Eds., Taylor and Francis, (2011).
- [BC1] D. R. Cairns, "Mechanical Reliability of Conductive Polymers for Rollable Display Applications" in *Flexible Flat Panel Displays*, G. P. Crawford Editor, Wiley, (2005).

Patents

- [P11] D. R. Cairns, W. W. Huebsch, K. A. Sierros and M. S. Shafran, "Stimulus Responsive Nanoparticles", US 9,035,644 (2015).
- [P10] D. R. Cairns, W. W. Huebsch, K. A. Sierros and M. S. Shafran, "Stimulus Responsive Nanoparticles", US 8,367,260 (2013).
- [P9] P. J. Richter, D. R. Cairns and F. J. Bottari, "Wiring Harness and Touch Sensor Incorporating Same", US 8,194,044 (2012).
- [P8] Paul J. Richter, D.R. Cairns and Frank J. Bottari, "Touch Screen Comprising Antiglare Coating Articles", US 8,003,194 (2011).
- [P7] Paul J. Richter, D.R. Cairns and Frank J. Bottari, "Antiglare Coating and Articles", US 7,780,776 (2010).
- [P6] Paul J. Richter, D.R. Cairns and Frank J. Bottari, "Antiglare Coating and Articles", US 7,736,428 (2010).
- [P5] E. M. Cross, R. M. Moshrefzadeh, F. J. Bottari, A. F. Chernefsky, D. R. Cairns &, P. J. Richter "Capacitive touch screen with conductive polymer", US 7,477,242 (2009).

- [P4] P. J. Richter, D. R. Cairns and F. J. Bottari, "Wiring Harness and Touch Sensor Incorporating Same", US 7,339,579 (2008).
- [P3] Paul J. Richter, D. R. Cairns and Frank J. Bottari, "Antiglare Coating and Articles", US 7,294,405 (2007).
- [P2] Paul J. Richter, D. R. Cairns and Frank J. Bottari, "Antiglare Coating and Articles", US 7,291,386 (2007).
- [P1] G. P. Crawford, D. R. Cairns, C. C. Bowley, S. Danworaphong, A. K. Fontecchio S. M. Faris and L. Li, "Reflective Strain Gauge with Aspected Particles and Polarization Sensitive Devices" US 6,778,236 (2004).

Published Pending Patent Applications

- [A1] A. J. Kessman and D. R. Cairns, "Hydrophobic and Oleophobic Coatings", US 13/086,305 (2011).
- [A2] Paul J. Richter, D. R. Cairns and Frank J. Bottari, "Antiglare Coating and Articles", US 11/863,317 (2007).

Conference

- [C0] Z. Georgieva, R. Curtis, T. A. S. Saenz, M. D. Solley, D. Cairns, "Impact of attending a research experience for teachers program with international and societally relevant components" 120th ASEE Annual Conference and Exposition; Atlanta, GA; United States; 23 June 2013 through 26 June 2013
- [C1] K. A. Sierros, D. R. Cairns, D. S. Hecht, C. Ladous, R. Lee, C. Niu, 'Highly durable transparent carbon nanotube films for flexible displays and touch screens', Society of Information Display Digest of Technical Papers, 41, 882 (2010).
- [C2] K. A. Sierros, D. A. Banerjee, D. R. Cairns, R. Bozich, 'Durable solid state flexible LED devices', Society of Information Display Digest of Technical Papers, 41, 1942 (2010).
- [C3] N. J. Morris, K. A. Sierros, R. Nair, N. X. Randall, D. R. Cairns, "Scratch and indentation of indium tin oxide films on polyester substrates", Wear of Materials, Las Vegas, NV, April 19th-22nd 2009.
- [C4] D. K. P. Huckaby and D. R. Cairns, "Quantifying "Sparkle" of anti-Glare surfaces", Society of Information Display Digest of Technical Papers, 40, 511 (2009).
- [C5] J. S. R. Murillo, M. E. Bachlechner, E. J. Barbero and D. R. Cairns, "Towards Toughening and Understanding of Silica Aerogels - MD Simulations", 2008 ASME International Mechanical Engineering Congress & Exposition, Boston, MA, October 31st - November 6th, 2008 (2008).
- [C6] K. A. Sierros, N. J. Morris, K. Ramji, D. R. Cairns and S. N. Kukureka, "Mechanical Assisted Corrosion: An Investigation of Thin Film Components used in Flexible Optoelectronic Applications", Society of Information Display Digest of Technical Papers, 39, 1461 (2008).
- [C7] K. Ramji, D. R. Cairns, K. A. Sierros and S. N. Kukureka, "Stress Corrosion Cracking of Patterned Indium Tin Oxide Electrodes for Flexible Displays", Society of Information Display Digest of Technical Papers, 38, 1790 (2007).

- [C8] D. R. Cairns, "Mechanical Studies of Indium Tin Oxide Coated Polymer Films for Flexible Displays" Integrated Structures Symposium ASME McMat, Austin TX (2007).
- [C9] D. R. Cairns & P. Evans, "Laser Speckle of Textured Surfaces: Towards High Performance Anti-Glare Surfaces", Society of Information Display Digest of Technical Papers, 38, 407 (2007).
- [C10] F. A. Pertl, D. R. Cairns, and J. E. Smith, "Mechanically Controllable Polarizing Attenuator for Display Applications", IDRC 2006, 312 (2006).
- [C11] D. R. Cairns and M. S. Shafran, "Cross-Linked Liquid Crystal Mesosstructures for Electro-Rheological Fluids", MRS Symposium Boston MA, (2006).
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Prior to Joining WVU

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