

GREGORY PHILIP CRAWFORD

Vice President and Associate Provost

Professor of Physics

University of Notre Dame

PROFESSIONAL EXPERIENCE

- 2015-present** Vice President and Associate Provost, *University of Notre Dame*,
Notre Dame, IN
- 2008-present** Professor of Physics, *University of Notre Dame*
- 2008-2015** William K. Warren Foundation Dean, College of Science,
University of Notre Dame
- 2011-2013** Member of the Board of Trustees, *Saint Joseph Regional Medical Center*,
Mishawaka, IN
- 2010-2012** Member of the Board, *Economic Development Corporation of Elkhart
County*, Elkhart, IN
- 2010-present** Adjunct Professor of Medicine, *Indiana University School of
Medicine-South Bend*, South Bend, IN
- 2006-2008** Dean of Engineering, *Brown University*, Providence, RI
- 2006-2008** Professor of Engineering and Physics, *Brown University*
- 2006-2010** Cofounder and Member of the Scientific Advisory Board, *Corum Medical*,
Framingham, MA
- 2004-2006** Director, Engineering Graduate Program, ESCE Engineering Executives
Committee Representative, *Brown University*
- 2004-2013** Cofounder and Member of the Scientific Advisory Board, *Myomics*,
Providence, RI
- 2003-2004** Sabbatical Professor, *Technical University of Eindhoven*, Eindhoven, The
Netherlands
- 2001-2006** Associate Professor of Engineering and Physics, *Brown University*
- 1999-2001** Richard and Edna Salomon Assistant Professor Chair, *Brown University*
- 1999** (NATLAB), Summer Visiting Professor, *Philips Research Laboratory*,
Eindhoven, The Netherlands
- 1996-2001** Assistant Professor, Division of Engineering, *Brown University*
- 1995-1996** Research Engineer, Electronics and Imaging Laboratory, *Xerox Palo Alto
Research Center (PARC)*, Palo Alto, CA [spun-off as *dpiX* in March 1996]
- 1995-1996** Adjunct Part-time Instructor, Department of Materials Engineering, *San
Jose State University*, San Jose, CA (concurrently with *Xerox PARC*)
- 1993-1994** National Research Council Postdoctoral Fellow, *Naval Research
Laboratory*, Washington, D.C.
- 1992-1993** Postdoctoral Fellow, *Liquid Crystal Institute and National Science
Foundation's Science & Technology Center ALCOM*, *Kent State University*,
Kent, OH
- 1988-1991** Research Assistant, *Liquid Crystal Institute, Kent State University*, Advisor:
Professor J. William Doane
- 1988-1991** Teaching Assistant, Department of Physics, *Kent State University*
- 1987** Summer Research Assistant, *Liquid Crystal Institute, Kent State University*

EDUCATION

1991 Kent State University

Ph.D., Chemical Physics

NSF Science and Technology Center for Advanced Liquid Crystalline and Optical Materials and Liquid Crystal Institute

Thesis: "Surface Anchoring and Elastic Properties of Confined Liquid Crystals"
(Advisor: Professor J. William Doane)

1988 Kent State University

M.A., Physics

1987 Kent State University

B.S., Physics and Mathematics

ACADEMIC EXPERIENCE SUMMARY

2015-Present – University of Notre Dame, Notre Dame, Indiana

Vice President and Associate Provost (2015-present): Oversight of Notre Dame California, a physical University presence in California organized around six aims: (1) Elevate career and experiential learning opportunities for students; (2) Enrich admissions and enrollment pools with diverse, high-achieving students; (3) Expand development efforts and strengthen alumni engagement; (4) Enhance graduate programs and new professional degree options; (5) Accelerate intellectual property and start-up activity; and (6) Augment research opportunities through industry partnerships. Additionally, was responsible for other special campus projects related to undergraduate experiential learning and innovative admissions systems.

Notre Dame California Responsibilities

- Shaped vision (2009-11), developed strategic plan and benchmarking comparisons to other satellite universities (2011-13), and launched Notre Dame (ND) California (2014).
- Leading state approval process for permission to operate in California through Bureau for Private Postsecondary Education (BPPSE).
- Integrate and coordinate ND California with units in South Bend: Admissions strategies to attract top high school students; young alumni strategies for early and ongoing engagement; career service and experiential learning strategies to place students in exciting internship and employment opportunities in top companies.
- Implement inclusive excellence strategy, with connections to Notre Dame's efforts in Women in Leadership and Latino Studies. Diversity in STEM Panel Event with Racing Toward Diversity, United Athletes Foundation, and the NFL Players Networking Event during Super Bowl 50 Weekend.
- First-year accomplishments include a significant increase in summer internships (in 2015, over 100 students were placed in Silicon Valley); increased admissions yield for incoming freshmen from California (yield increased ~7%); interactions with over 60 companies; developed one-week immersions for students in Silicon Valley; and developed seed research project on cognitive computing and materials science with IBM Almaden.

**The California Initiative formally launched in August 2014. From 2014-2015, I was overseeing the California Initiative while remaining dean until the new dean was in place.*

Non-California Responsibilities

- Co-lead on Bitcoin Project Committee, in collaboration with Development, to initiate a campus-wide digital currency project as an experiential learning and co-curricular tool.
- Interactive data visualization and insight discovery admissions platform, a collaboration between Admissions and SynGlyphX, a novel visualization technology interface to enhance/improve/optimize admission decisions.

Significant Committee Assignments

- President's Leadership Council (PLC)
- Provost's Council Committee (composed of vice presidents and associate provosts)
- Board of Trustees Academic Faculty Affairs Committee
- Notre Dame California Advisory Committee
- Notre Dame Research and Commercialization Advisory Committee (commissioned with Trustees and technology and industry experts)

William K. Warren Foundation Dean, College of Science (2008-2015): Oversaw five academic departments and several departmental centers. Led overall vision and strategic planning; oversaw College academic core and structural support; advanced Science in the context of Notre Dame's identity as a residential liberal arts college in a dynamic research university setting with select premier graduate programs; supported and evaluated faculty teaching and research; made tenure and promotion decisions and high-level appointments to faculty positions, including external recruitment to full professorships and endowed chairs; appointed and reviewed department chairpersons and directors of several centers as well as support staff; engaged in fundraising, external representation and advocacy, and major budgeting responsibilities and priorities; developed leadership within the College; reviewed and evaluated departments.

- Oversaw ~170 tenure-track/tenured faculty members, ~50 teaching faculty, ~30 research faculty, ~1,200 undergraduate students (sophomore-senior) and ~500 freshman undergraduate science intents, ~250 graduate students, ~120 postdoctoral fellows, and ~120 staff members.
- Administered seven Ph.D., eight M.S., and 16 B.S. degree programs.
- Launched new department of Applied and Computational Mathematics and Statistics (ACMS); collaborated with faculty to shape vision and usher through governance process.
- Fully implemented inclusive excellence plan, a synergy and integration of academic excellence and diversity, through collaborative efforts with chairs and associate deans.
- Led strategic hiring thrust in College (55 tenure and tenure-track hires in seven years, enabling significant startup investment, and 30 full-time professional teaching faculty).
- Transformed and restructured faculty governance procedures in the College departments (full voting of all faculty at rank rather than small committee).
- Overhauled tenure and promotion expectations (2010), a College-wide collaboration with chairs and associate deans.
- Developed Strategic Plan (2008, revamped in 2013), and oversaw development of complementary departmental plans, including alignment with College and University plans.
- Collaborated with deans and associate deans, vice president for research office and provost office on design, space management plans, and assignment of new 220,000 ft² research building for faculty in chemistry, biochemistry, and chemical engineering.
- Grew research awards from \$34M in 2009 to \$49.2M in 2015.
- Led and moderated the Science Advisory Committee of ~50 external members.

Undergraduate Curriculum Initiatives

- Achieved significant growth of undergraduate participation in research (<20% → >50% during tenure as dean), including identification of associated funding.
- Developed new departmental honors programs funded largely through philanthropy, including endowments for two honors programs. Developed robust summer funding program for undergraduate research.
- Established summer internship programs with partner organizations MD Anderson Cancer Center (Houston) and Cold Spring Harbor Laboratory (Long Island).
- Co-funded and supported cross-college interdisciplinary scholarly research with College of Arts and Letters.
- Led and championed approvals of new interdisciplinary undergraduate degree programs in science: neuroscience (~250 B.S./B.A. majors in two years), a collaborative effort between the colleges of Science and Arts and Letters; applied mathematics and statistics (~250 majors/supplemental majors in four years); and a minor in sustainability for any major (~40 students participate annually).
- Oversaw Center for Health Science Advising (responsible for ~600 students annually – >350 students apply to medical/dental school each year, with ~80-85% receiving at least one acceptance).
- Launched and oversaw the Hillebrand Center for Compassionate Care in Medicine (2011) for premedical and allied health students (nearly 700 students participate each year).
- Conceived, launched, and taught one-credit hour, professionally-oriented courses in leadership (SC 53340), ethics (SC 53310), diversity (SC 53320), and policy (CSC 33902) as well as a communications workshop connecting liberal arts and the sciences. Diversity course received media attention [e.g., “See the Future...,” *Racing Toward Diversity*, 2013].
- Shared oversight of University’s Glynn Family Honors Program (~100 students per class, split between Science and Arts and Letters). The honors program doubled in size during tenure as dean through enhancement of endowment.
- Supported and co-funded online learning launch in 2014 with inaugural online courses in multiple disciplines. Built and funded light board facility for digitizing faculty lectures.
- Launched and funded grants for innovative teaching. Examples of funded grants include advancing biological knowledge through “real life” physics demonstrations, digital learning platform (3D simulation) for organic chemistry, flipped molecular genetics classroom, online learning for active engagement in ecology, real-time classroom computer simulations in evolution, real-time diagnostic test for calculus, and calculus in the flipped classroom.
- Launched and supported peer mentoring and tutoring for students needing extra assistance (20 peer tutors per year) – Peer Led Team Learning (PLTL).

Graduate, Postdoctoral, and Research Initiatives

- Boosted *U.S. News* percentile rankings in graduate programs in collaboration with department chair leadership team in all departments and in the sub-disciplines of Logic and Nuclear Physics.
- Launched four professional master’s degree programs: Entrepreneurial master’s program—ESTEEM—in collaboration with Business and Engineering; Global Health; Patent Law in collaboration with Law and Engineering; and Applied Statistics/Predictive Analytics.
- Launched Integrated Biomedical Sciences Ph.D. program (seven new interdisciplinary training clusters – Biophysics and Structural Biology, Cancer Biology, Chemical Biology and Molecular Pharmacology, Computational Biology and Bioinformatics, Genomics and Proteomics, Immunology and Infectious Disease, and Molecular, Cellular and Developmental Biology). Funded through a significant endowment.

- Launched Ph.D. program in Applied and Computational Mathematics and Statistics (~20 Ph.D. students in two years).
- Launched and successfully raised endowment or funding for several new College centers: Center for Mathematics (2011), Warren Family Center for Drug Discovery (2014), Boler-Parseghian Center for Rare and Neglected Diseases (2014), and Center for Stem Cell Biology and Regenerative Medicine (2014).
- Developed and raised funds for Innovation and Entrepreneurial Postdoctoral Fellow program to advance more fully high-risk, high-impact research.
- Created and launched the Life Science Entrepreneurship Mentorship Program, where alumni in the life science industry mentor our faculty and students.
- Partnered and aligned with *Indiana University School of Medicine* (Harper Cancer Institute, Indiana Clinical and Translational Sciences Institute, and cross-institutional appointments).
- Supported Moreau Minority Postdoctoral Program (recruited two scholars).
- Enhanced awards committees for faculty (>20 additional American Association for the Advancement of Science [AAAS] members since 2008).

International Efforts

- Collaborated with Notre Dame International and departments on undergraduate student study abroad experiences and Ford Family Program in Human Development. Created and led the international immersion experience in Japan for undergraduates (2009).
- Supported and led a contingent of faculty to Mexico for Notre Dame Research Day at El Colegio Nacional in Mexico City. Co-led partnerships planning trips to Uganda and Kenya in cooperation with the Ford Family Program (Supported undergraduate summer learning experiences in Africa). Visited Hong Kong and Japan for collaboration planning with both universities and industry. Supported research and planning trip to Pontifical University of Chile for department chairs and associate/assistant deans to establish research partnerships.
- Oversaw, co-developed, and launched (2011) the Master of Science in Global Health. The capstone of the program usually involves six to eight weeks of hands-on research experience in a resource-poor international environment. Students have worked in the following countries: Belize, Democratic Republic of Congo, Dominican Republic, Ecuador, Haiti, Honduras, India, Indonesia, Kenya, Lesotho, Malaysia, Mexico, Moldova, Nigeria, Peru, Sierra Leone, Tanzania, Trinidad and Tobago, Uganda, and Zambia.
- Oversaw Notre Dame Haiti Program, one of University's premier mission engagement and research initiatives, with a goal of eliminating the debilitating and disfiguring disease of lymphatic filariasis (LF) from Haiti by 2020; the program has positively impacted the lives of millions of Haitians susceptible to LF while simultaneously altering the trajectory of a nation through the introduction of Haiti's first supply of iodized salt. Regularly visited Haiti for program evaluation and partner meetings.

Philanthropy

- Engaged Spirit of Notre Dame Campaign (\$2B University goal) and upcoming Boldly Notre Dame. From 2009-2015, a total of ~\$140M targeted to the College of Science.
- Raised endowment for Warren Family Center for Drug Discovery, the Boler-Parseghian Center for Rare and Neglected Diseases, and the Center for Stem Cell and Regenerative Medicine. Raised endowed assistant professorships in cancer, rare disease, stem cell, nuclear physics, and mathematics. Numerous gifts for Niemann-Pick Type C research, Haiti program, graduate fellowships, and entrepreneurial student fund. Numerous gifts raised for

undergraduate research, innovation, postdoctoral fellows, actuarial science, neuroscience, and Center for Mathematics.

- Presented to >60 Notre Dame Alumni Clubs in various cities in over seven years as dean.

Community and Outreach

- Developed “Cultural Passport” with South Bend mayor’s office, encouraging Science students to visit community cultural sites.
- Launched and raised funds for the DNA Learning Center in collaboration with Cold Spring Harbor (2014) (>1,100 K-12 students participated in the inaugural year).
- Oversaw QuarkNet Center, a long-term, research-based, national teacher professional development program, with a site at Notre Dame engaging local teachers and students.
- Raised ~\$2M in research and clinical trial funds, as well as overall awareness, for the rare disease Niemann-Pick Type C, in collaboration with former two-time national championship football coach Ara Parseghian, by personally conducting five cross-country bicycle rides, totaling nearly 15,000 miles.
- Supported community fundraising for breast cancer, in collaboration with Notre Dame Women’s Basketball and local country club (five 24-hour Spin-a-thons, five Pink Zone luncheon fundraisers in five years).
- Supported community fundraising for Niemann-Pick Type C with rugby and cycling teams.
- Supported fundraising for the Center for the Homeless (Dancing with Our Stars participant).
- Enthusiastically supported student community fundraising initiatives (Vision Walk, Bald is Beautiful, Dodge Ball for Breast Cancer, Meals on Wheels, etc.).
- Collaborated extensively with projects and community leaders around economic development.

Significant Committee Assignments

- Provost Advisory Committee (PAC) for tenure and promotion of all departments/colleges/schools on campus
- Core Curriculum Review (co-chair) involving a 10-year review and structuring of core requirements
- Conflict of Interest Policy Committee, subcommittee of PAC (chair)
- Academic Council (final approval of all major University decisions)
- University Committee on Intellectual Property
- Notre Dame Research and Commercialization Committee (NDRCC)
- University Research Committee
- College of Science Deans and Chairs Leadership Committee (DAC) (chair)
- Harper Cancer Research Institute Governing Board (joint board between Notre Dame and Indiana University School of Medicine to oversee the Harper Cancer Research Institute)
- External Committee at North Carolina A&T on school/college organization

Faculty Member in Department of Physics (2008-present): Active research in biomedical optics and bedside monitoring with thrusts in non-invasive hemoglobin (Hgb) detection, bruise aging in abuse cases, and identifying connected veins/arteries in fetal-fetal twin transfusion syndrome [Collaborators—Mark Alber (*University of Notre Dame*), Gregory Jay, Susan Duffy, Francois Luks (*Rhode Island Hospital and Brown University*)]. Funded by National Science Foundation and Gerber Foundation. Instructed several courses, both within and outside the Department of Physics.

Personal Research Initiatives

- Clinical evaluation of bruise aging device at Rhode Island Hospital focused on a solution for child abuse cases.
- Bruising project selected for NBC Notre Dame football halftime “Fighting For” commercial in 2012 [based on “Reflectance Spectrometry of Normal and Bruised Human Skin: Experiments and Modeling,” *Physiological Measurement* **33**, 1-17 (2012)].
- 12 scholarly publications and book chapters, 2008-present. Completed edited volume *Cross-Linked Liquid Crystalline Systems: From Rigid Polymer Networks to Elastomers*, with D.J. Broer, and S. Zumer (London: CRC, 2011). One Ph.D. physics student completed their thesis under my direction, as well as two entrepreneurship master’s students.

Personal Teaching Initiatives

- Created, instructed, or co-instructed several courses including Junior Physics Seminar (PHYS 33410), Scientific Entrepreneurship (SC 48100), Ethics in Science (SC 53310), Scientific and Medical Leadership (SC 53340), Technical Marketing (ESTM 60102), Diversity, Culture, Religion in Science (SC 53320), and Science Policy Ethics—Guiding Science Through Regulation of Research and Funding (SCS/SC 33902).
- Leading a reimagining of science education, combining liberal arts and science, funded by Templeton Foundation (with Dom Chaloner), entitled “A New, Holistic Paradigm for Undergraduate STEM Education: Inspiring Big Questions and Cultivating Virtuous Scientists.”

2010-present – Indiana School of Medicine-South Bend (IUSM-SB), South Bend, Indiana

Adjunct Professor of Medicine: Appointment enabled access to medical school facilities, faculty, and leaders for developing collaborations and advancing bio-optics research.

- Interact with *IUSM-SB* broadly through Harper Cancer Institute and Indiana Clinical and Translational Sciences Institute (I-CTSI).
- Cooperate for cross-institutional collaborations, spousal opportunities and recruitment, and the *IUSM-SB/Notre Dame* joint degrees, M.S. in Global Health/M.D.

1996-2008 – Brown University, Providence, Rhode Island

Dean of Engineering (2006-2008): Oversaw five academic groups, seven ABET-accredited undergraduate programs, and five Ph.D. programs. Led overall vision and strategic planning; advanced Engineering in the context of Brown’s identity as a strong liberal arts college in a thriving research university setting with select premier graduate programs; supported and assessed faculty teaching and research; made tenure and promotion decisions; appointed faculty, including recruiting senior faculty recruitment to full professorships and endowed chairs; led fundraising and external representation and promotion; handled major budgeting responsibilities and priorities; developed leadership within the Division; and conducted departmental reviews and ABET Accreditation.

- Oversaw five research groups in the division and several other programs and facilities. Responsible for seven ABET accredited undergraduate degree programs. Held oversight responsibility over students (~400 undergraduate, ~150 graduate), faculty (39 tenured/tenure track, three research, 19 adjunct), and staff (29).
- Reviewed and modified tenure and promotion expectations, approved by all faculty in the Division of Engineering.
- Facilitated discussions and initiated early planning for the School of Engineering concept.

- Led and moderated the Engineering Advisory Committee of approximately 25 external members.

Undergraduate Curriculum Initiatives

- Oversaw two ABET accreditation visits (2006, follow-up visits) in Biomedical Engineering and Computer Engineering.
- Oversaw preparation of ABET accreditation visit for all engineering programs (2008).
- Collaborated with colleagues and department chairs and executed Commerce, Organizations and Entrepreneurship (COE) concentration, a joint degree among the departments of economics and sociology and the Division of Engineering. Advised the engineering track (COE, now known as C.V. Starr Program in Business, Entrepreneurship and Organizations).
- Co-developed and co-instructed the course “Engineers of the Future: Architects of Dreams,” building on the transferable skill sets learned by students in engineering curriculum while broadening virtuous thinking and learning.
- Supported and enhanced relationship and joint course offerings with *Rhode Island School of Design*.
- Supported and coordinated summer work experiences in India for undergraduate students.
- Interfaced and trained students in REU program from HCBU and universities in Puerto Rico.
- Sponsored and supported student social and career enhancement events.

Graduate, Postdoctoral, and Research Initiatives

- Co-architect of the professional master’s degree, Program in Innovation Management and Entrepreneurship (PRIME) (with Eric Suuberg). [20 students accepted each year.]
- Developed global immersion experience for PRIME master’s students (co-led trips to the Netherlands and India).
- Oversight responsibility for M.S. and Ph.D. programs in Electrical Engineering; Fluids, Thermal and Chemical Processes; Solid Mechanics; and Materials Engineering, and co-responsible for Biomedical Engineering (with dean of medical school).
- Facilitated interactions with local hospitals and *Brown University Warren Alpert Medical School* faculty as dean [“Engineering-Physician Collaboration Model Aids Biophotonics in Medicine,” *Biophotonics International*, November 2007].
- Co-developed and implemented the scholarly concentration Medical Technology and Innovation in the *Warren Alpert Medical School* for medical students (with Gregory Jay).
- Co-designed and implemented a new graduate course experience on translational science for campus graduate and medical students (with Gregory Jay).

International Efforts

- Collaborated with international programs to place more engineering students in semester aboard programs.
- Co-developed with colleagues a summer internship program in India and oversaw the engineering students in the program.
- Co-developed an international immersion experience for master’s students in PRIME, leading student cohorts to The Netherlands (2007) and India (2008).

Philanthropy

- Worked extensively with the Boldly Brown Campaign through Alumni Office and Corporate and Foundation Relations (\$1.5B University goal);

- Presented at *Brown University* Alumni Clubs around the country.

Significant Committee Assignments

- President’s Executive Committee with other deans and senior leadership.
- Commerce, Organizations and Entrepreneurship (COE) oversight committee.
- Engineering Executive Committee (chair).
- Radiation Safety Committee.

Community and Outreach

- NSF K-12 Mentor in local elementary school on East Side.
- Collaborated extensively with projects and community leaders around economic development.

Director of Graduate Programs and Electrical Sciences Representative on EEC (2006-2008)

- Oversaw teaching assistantships and research fellowships for five graduate programs in Division of Engineering. Liaison with Graduate School and Division.
- Served as Electrical Sciences representative on Engineering Executive Committee (EEC) (Brown Engineering equivalent of a program director/chair) with responsibility for teaching schedule, ABET assessment, annual junior faculty evaluations, and committee assignments for tenure and promotion.
- Advised on high-level division matters with dean to build consensus around initiatives, conduct strategic planning, and discuss and plan for concerns, issues, and emerging opportunities.

Faculty Member Engineering and Physics (1996-2008)

2006-2008	Full Professor of Engineering Full Professor of Physics
2002-2006	Associate Professor of Engineering Associate Professor of Physics
1999-2002	Richard Solomon Assistant Professor (endowed position)
1996-2002	Assistant Professor of Engineering Assistant Professor of Physics

Personal Teaching, Instruction, and Mentoring

- Co-developed yearlong experiential learning course entitled Engineering Entrepreneurship (EN 193-194 S07, NSF funded), enrolling all concentrations from campus (with Eric Suuberg) [“A Technology Based Entrepreneurship Course,” *International Journal of Engineering Education* **21**, 239-256 (2005)]. Students collaborated on business plans and designs for local companies.
- Taught undergraduate courses: Introduction to Engineering (EN 3), Electricity and Magnetism (EN 51), Electrical and Optical Systems (EN 52), Managerial Decision Making (EN 90), Applied Electromagnetics (EN 156), Biophotonics (EN 193 S01), Engineers of the Future, Architects of Dreams (ENEN 193V).
- Supervised many undergraduate research assistants in my laboratory; several were co-authors on peer-reviewed publications and presenters at conferences.
- Implemented peer instruction techniques utilized in Electricity and Magnetism (EN 51).
- Implemented studio-teaching laboratory (and co-designed studio space in new building) to integrate laboratory and lecture in Electricity and Magnetism (EN 51).

- Introduced Socratic teaching methods to blend the humanistic and liberal arts elements into engineering design, Engineers of the Future, Architects of Dreams (ENEN 193V).
- Taught and co-taught graduate courses: Breakthrough Technologies (EN 291 S38), Topics in Translational Research and Medicine (EN 291G), and Flat Panel Displays and Devices (EN 292 S16).
- Developed Ph.D. level entrepreneurship course based on Ph.D. thesis work; students worked closely with Technology Transfer.

Personal Research Initiatives

- Constructed modern research laboratory for liquid crystal materials research, magnetic resonance, optics, and bio-optics.
- Published >350 research publications, review articles, books chapters and patents.
- Received significant external funding from government agencies (NSF, NASA, DARPA, Navy), private industry (Xerox, 3M, Corning, Digilens, Microtouch, Optron, Fuji, Raytheon, Foster-Miller, Opto-Knowledge, Reveo, Radiant Images, Spectra Science, Scientific Solutions), state funding, and foundations.
- Co-PI on two NSF Nanoscale Interdisciplinary Research Team (NIRT) awards, strength of materials and nanotoxicity.
- Conducted research projects requiring human clinical trials (IRB) and animal studies (IACUC), intellectual property associated with translational research, and ethical and compliance issues associated with biomedical research.
- Demonstrated an interdisciplinary mindset—published and collaborated with colleagues in all engineering groups as well as physicists, chemists, biologists, and physicians.
- Member of National Science Foundation’s Materials Research Science and Engineering Center (NSF MRSEC) on Micro- and Nano-Mechanics of Electronic and Structural Materials at *Brown University* (led corporate and outreach efforts).
- Graduate student advisees succeeded at highly competitive awards: Materials Research Society (MRS) Gold Medal award, Congressional Fellowship, MRS Silver Medal award, Optical Society of America (OSA) Graduate Student Focus award, International Liquid Crystal (ILCC) Best Poster award, Society for Information Display (SID) Best Paper award, SPIE scholarships, and the International Liquid Crystal Society Glenn Brown award.
- Fostered an interdisciplinary laboratory culture: Of 15 students who graduated with a Ph.D. degree in my laboratory, six received degrees in electrical engineering, six in physics, two in biomedical engineering, and one in materials science. Of the four terminal master’s students who graduated with a M.S. degree in my laboratory, two were in electrical engineering, one in chemical engineering, and one in biology.
- Research interests and collaborative connections enabled world travel, including visits to Italy, Germany, France, Netherlands, Portugal, Sweden, Slovenia, Spain, Hungary, England, Scotland, Ireland, Iceland, Switzerland, Slovenia (former Yugoslavia), Canada, Japan, China, Korea, Malaysia, India, Singapore, and Taiwan.

Community and Outreach

- Active in education outreach using science, engineering and entrepreneurship concepts in K-12 education, included constituencies of troubled (Bridge School) and incarcerated teens (Rhode Island Training School) funded by NSF.
- Active outreach participant and outreach coordinator for NSF MRSEC Funded Center on Micro- and Nano-Mechanics.
- Co-PI on K-12 grant to fund Ph.D. students to work in local schools (with Haberstrogh, Tucker, Targen, Herbert). Personally taught in local elementary school.

2003-2004 – Technical University of Eindhoven (TU/e), Eindhoven, Netherlands

Visiting Professor (on sabbatical), Department of Chemical Engineering and Chemistry

- Charged with transferring entrepreneurial pedagogy experience from *Brown University* to master's program at the TU/e in the Department of Chemical Engineering and Chemistry. Focused on “fuzzy” front-end model in academy with projects in polymer composites, materials for counterfeit measures in formal documents, and passive solar power applications [model published in “Engineering Education on the Fuzzy Front End: A Student Entrepreneurship Model,” *European Journal of Engineering Education* **31**(2), 145-153 (2006)]. Mentored five entrepreneurship master's students.
- Developed configurations and models for μ -rubbing method for multi-domain pixels; invented/investigated configuration for patterning polymer morphologies addressed thermally.
- NSF funded Ph.D. students at *Brown University* medium-term stays at the TU/e during my sabbatical (several months).
- Sabbatical research at the TU/e resulted in 12 publications.

1996 – San Jose State University, San Jose, California

Part-Time Adjunct Faculty, Department of Materials Engineering

- Instructed evening master's course students – predominantly professional engineers from Silicon Valley – on flat panel display technology including liquid crystal displays, light emitting diodes, field emitters, projection configurations, and reflective, low-power devices. Instructed evening class during employment at Xerox PARC.

1992-1993 – Kent State University, Kent, Ohio

Postdoctoral Fellow, Liquid Crystal Institute and NSF ALCOM Science and Technology Center

- Conducted interdisciplinary studies of liquid crystal and polymer materials.
- Developed nuclear magnetic resonance techniques to measure surface-induced order in nano-confined liquid crystals. Optical methods to measure the bulk and surface elastic constants in liquid crystal materials in nano- and micro- confinements.
- Committed participant of the NSF ALCOM Center Outreach Activities for K-12 students in the region.

GOVERNMENT EXPERIENCE

1993-1994 – Naval Research Laboratory, Washington, D.C.

Postdoctoral Fellow, National Research Council (NRC) award recipient

- Investigated electroclinic liquid crystal materials for μ s-switching, optical phase/amplitude modulators for Navy relevant imaging and electro-optic applications. Studied optical properties of ferroelectric liquid crystal polymers for fast switching electro-optic applications.
- Applied X-ray diffraction techniques to understand undulations in chiral smectic A liquid crystals exposed to external electric field.
- Research resulted in six publications and one patent.
- Active in K-12 education outreach in the Washington, D.C., area.

BOARD EXPERIENCE

2011-2013 – Saint Joseph Regional Medical Center (SJRMC), Mishawaka, Indiana

Member of the Board of Trustees: Served three-year term on a board of 19 individuals responsible for general oversight of not-for-profit SJRMC, a newly-constructed \$355M, 658,000-square-foot, 254-bed acute care hospital, 40-bed Saint Joseph Rehabilitation Institute, 20 practices of the Saint Joseph Physician Network, community health centers, and additional points of access.

- Served on the strategic planning subcommittee focused on market expansion, competitive landscape, emerging opportunities, and business strategy.
- Advised on impact and planning for the Affordable Care Act.

2010-2012 – Economic Development Corporation of Elkhart County, Elkhart, Indiana

Member of the Board: Served a three-year term on the board with 27 individuals with oversight responsibilities of the EDC, a not-for-profit economic organization serving the community with the cities, towns, chambers of commerce, investor partners, and businesses of Elkhart County, Indiana.

- Primary objectives of the board include planning, oversight and networking for the retention and expansion of local businesses and attraction of new businesses to Elkhart County plus local entrepreneurial development.
- Served on the strategic planning subcommittee charged with developing a completely new plan.

INDUSTRY & ENTREPRENEURIAL EXPERIENCE

2006-2010 – Corum Medical, Framingham, Massachusetts

Cofounder (2006) and Scientific Advisory Board (2006-2010): Cofounded with colleagues at *Brown Medical School* (Gregory Jay, Selim Suner, John McMurdy, and Alan Kivnik) and recruited CEO and key employees of company.

- Company based on non-invasive device to measure hemoglobin (Hgb) with visible spectroscopy from conjunctiva [Seminal paper “Diffuse Reflectance Spectrum of the Palpebral Conjunctiva and Its Utility as a Non-Invasive Indicator of Total Hgb,” *Journal of Biomedical Optics* **11**, 014019 (2006)].
- Integral to licensing agreement and negotiation, business planning, investment, and NSF/NIH SBIR proposal preparation.

2004-2013 – Myomics, Providence, Rhode Island

Cofounder (2004) and Scientific Advisory Board (2006-2013): Cofounded with colleagues and alumni at *Brown University* (Herman Vandenburg, Robert Valentini, Victoria Barbata, and Frank Benesch).

- Company based on novel muscle-based drug screening platform for neuromuscular and cardiovascular disease [Seminal paper “Drug-Screening Platform Based on the Contractility of Tissue-Engineering Muscle,” *Muscle and Nerve* **37**, no. 4, 438-447 (2008)].
- Supported NSF and NIH SBIR/STTR proposal preparation.
- Engaged in development and production of an automated tissue engineering platform and mechano-optical screening system with a major role in physical modeling/measurement. Networked with potential biopharmaceutical partners, investors, and state economic development effort, the Slater Center. Integral to business planning, strategy, technology development, and IP generation to build patent portfolio.

1999 – Philips Research Laboratories, Eindhoven, Netherlands

Summer Visiting Professor: Research in the display development and materials group.

- Research focused on lasing pixel technology, where fluorescent dyes (laser dyes) were incorporated directly in the liquid crystal switchable pixel technology for luminous project displays.
- Investigated numerous fluorescence material options and pixel architectures. Influenced by Philips collaboration, shared facilities, and open innovation models for research.

1994-1996 – Xerox Palo Alto Research Center, Palo Alto, California

Staff Scientist: Constructed liquid crystal display (LCD) experimental prototype laboratory.

- Engaged in LCD optical characterization, fabrication processes, and prototyping LCDs from various materials configurations.
- Integral to materials development effort on DARPA funding and to intellectual property development from viewing angle, spacer technology to new modes of LCD operation (co-inventor on 11 U.S. issued patents).
- Significant interfacing with in-house and contracted intellectual property attorneys.
- Liaison for TFT prototype projection displays with Standish Industries in Lake Mills, WI (manufacturing partner).
- Member of the Xerox spin-off company dpiX (March 1996) which fueled my future passion for entrepreneurship in the academy and community.
- Enculturated by Xerox's collaborative spirit and intellectually stimulating environment, influencing me to assimilate such a culture in my academic laboratories.

AWARDS, HONORS & CITATIONS

2015 Guardian Angels Award

Awarded by *Dana's Angels Research Trust (DART)*, Greenwich, CT
Presented for commitment to raise money and awareness for Niemann-Pick Type C (NPC) disease

2014 Honored by Notre Dame Athletics

Recognized by *University of Notre Dame Department of Athletics*, Notre Dame, IN
Presented for fundraising with athletic teams for rare diseases and cancer

2013 City of Los Angeles Certificate of Recognition

Presented by the *City of Los Angeles*, Los Angeles, CA
Presented for bringing awareness to the rare disease Niemann-Pick Type C

2013 Honorary Citizen of Lake Charles

Awarded by *Lake Charles Mayor's Office*, Lake Charles, LA
Presented with key to City for efforts in raising funds for NPC disease

2013 Ernestine M. Raclin Award

Awarded by *1st Source Bank*, South Bend, IN
Presented for community leadership

2013 Distinguished Achievement Award

Awarded by *South Bend Alumni Association*, South Bend, IN
For leadership in community service (awarded jointly with Renate J. Crawford)

2012 Commencement Speaker

Kent State University, Kent, OH

- 2011 Rev. William A. Toohey, C.S.C., Award**
 Awarded by the *University of Notre Dame*
 Presented for emphasizing social justice in an exemplary way
- 2011 U.S. Army Certificate of Appreciation**
 Awarded by Col. Michael Chinn, *U.S. Army*, Indianapolis, IN
 Presented for patriotic civilian service associated with supporting Army ROTC
- 2009 Commencement Speaker**
Trinity School at Greenlawn, South Bend, IN
- 2007 Gordon Research Conference Chair (Elected)**
Colby-Sawyer College, New London, NH
- 2006 State of Rhode Island Citation**
 Citation by Lt. Gov. C.J. Fogarty, Providence, RI
 Recognized for research on anemia in developing countries
- 2005 Fellow, Society for Information Display**
Society for Information Display
- 2005 Outstanding Alumni Achievement Award**
 Awarded by President Carol Cartwright, *Kent State University*
 On the occasion of the 75th Anniversary of College of Arts and Sciences and Liquid Crystal Institute
- 2002 Ad Eundem, Master of Arts degree**
 Awarded by President Ruth Simmons, *Brown University*, Providence, RI
 On the occasion of receiving tenure at Brown University
- 2002 Certificate of Appreciation**
 Awarded by the *U.S. Patent and Trademark Office*, Arlington, VA
 Recognized for training patent examiners in display technology
- 2000 Onyx Teaching Award**
 Awarded by the Onyx Society, *Brown University*
- 1999 Certificate of Appreciation**
 Awarded by the *Urban League*, Providence, RI
 Presented for outreach activities to underrepresented students
- 1999 Teaching Excellence Award**
 Presented by the National Society of Black Engineers (*NSBE*), *Brown University Chapter*
- 1999 National Science Foundation Career Award**
National Science Foundation
- 1997 The Samuel Slater University/Industry Cooperation Award**
 Awarded by the *Slater Technology Fund*, Providence, RI
 Presented for cooperative research with industry
- 1997 Sigma Xi Honorary**
Brown University
- 1996 Outstanding Short Course Instructor**
University of California Los Angeles Extensions, Los Angeles, CA
 Recognized for teaching in short course on flat panel display technology
- 1996 Young Alumni Award**
Kent State University

- 1995 Alan Berman Publication Award**
Naval Research Laboratory
- 1994 Glenn H. Brown Award**
Awarded by the *International Liquid Crystal Society (ILCS)*, Budapest, Hungary
International Recognition Award for thesis on Liquid Crystals
- 1993 National Research Council Postdoctoral Fellow Award**
The National Academies of Sciences, Engineering, and Medicine
- 1992 Doctoral Dissertation Award**
Kent State University
- 1991 Sigma Xi Award for Doctoral Research**
Sigma Xi Society, Kent State University Chapter

1. PUBLICATIONS

1.1. Refereed Publications

1.1.1. Scholarly Journals

1. "Order and Self Diffusion in the First Molecular Layer at a Liquid Crystal Polymer Interface," *Physical Review Letters* **66**, 723-726 (1991), G. P. Crawford, D. K. Yang, S. Žumer, D. Finotello, and J. W. Doane.
2. "Escaped-Radial Nematic Configuration in Submicron-Size Cylindrical Cavities: Deuterium Nuclear Magnetic Resonance Study," *Physical Review A* **43**, 835-842 (1991), G. P. Crawford, M. Vilfan, J. W. Doane, and I. Vilfan.
3. "²H-NMR Study of Orientational Order in Binary Mixtures: A Nematic Phase of Biaxial Molecules," *Molecular Crystals Liquid Crystals* **203**, 45-49 (1991), G. L. Hoatson, J. M. Goetz, P. Palffy-Muhoray, G. P. Crawford, and J. W. Doane.
4. "Determination of the Liquid-Crystal Surface Elastic Constant K_{24} ," *Physical Review Letters* **67**, 1442-1445 (1991), D. W. Allender, G. P. Crawford, and J. W. Doane.
5. "Nematic Director Orientation in a Liquid-Crystal-Dispersed-Polymer: A Deuterium Nuclear Magnetic Resonance Approach," *Journal of Applied Physics* **70**, 135-143 (1991), R. Stannarius, G. P. Crawford, L. C. Chien, and J. W. Doane.
6. "Two Dimensional Deuteron Nuclear Magnetic Resonance of a Polymer Dispersed Nematic Liquid Crystal," *Journal of Chemical Physics* **95**, 2154-2161 (1991), J. Dolinsek, O. Jarh, M. Vilfan, S. Žumer, R. Blinc, J. W. Doane, and G. P. Crawford.
7. "Surface-Induced Orientational Order in the Isotropic Phase of a Liquid-Crystal Material," *Physical Review A* **44**, 2558-2569 (1991), G. P. Crawford, R. Stannarius, and J. W. Doane.
8. "Finite Molecular Anchoring in the Escaped-Radial Nematic Configuration: A ²H-NMR Study," *Physical Review A* **44**, 2570-2577 (1991), G. P. Crawford, D. W. Allender, J. W. Doane, M. Vilfan, and I. Vilfan.
9. " K_{33}/K_{11} Determination in Nematic Liquid Crystals: An Optical Birefringence Technique," *Applied Physics Letters* **60**, 3226-3228 (1992), G. P. Crawford, J. A. Mitcheltree, E. P. Boyko, W. Fritz, S. Žumer, and J. W. Doane.
10. "Orientational Effects on Confined 5CB," *Molecular Crystals Liquid Crystals* **222**, 205-213 (1992), G. S. Iannacchione, G. P. Crawford, J. W. Doane, and D. Finotello.

11. "Surface Elastic and Molecular Anchoring Properties of Nematic Liquid Crystals Confined to Cylindrical Cavities," *Physical Review A* **45**, 8693-8708 (1992), G. P. Crawford, D. W. Allender, and J. W. Doane.
12. "Characterization of the Cylindrical Cavities of Anopore and Nuclepore Membranes," *Journal of Chemical Physics* **96**, 7788-7796 (1992), G. P. Crawford, L. Steele, R. Ondris-Crawford, G. Iannacchione, J. Yeager, and D. Finotello.
13. "Deuteron Spin Relaxation and Molecular Dynamics of a Nematic Liquid Crystal (5CB) in Cylindrical Microcavities," *Journal of Chemical Physics* **98**, 3540-3547 (1993), N. Vrbancic, M. Vilfan, R. Blinc, J. Dolinsek, G. P. Crawford, and J. W. Doane.
14. "Curvature-Induced Configuration Transition in Confined Nematic Liquid Crystals," *Physical Review Letters* **70**, 194-197 (1993), R. Ondris-Crawford, G. P. Crawford, S. Žumer, and J. W. Doane.
15. "Alignment and Ordering Mechanisms at a Liquid Crystal-Solid Interface," *Liquid Crystals* **14**, 1573-1585 (1993), G. P. Crawford, R. J. Ondris-Crawford, S. Žumer, S. Keast, M. Neubert, and J. W. Doane.
16. "Frustrated Nematic Order in Porous Glass," *Physical Review Letters* **71**, 2595-2598 (1993), G. S. Iannacchione, G. P. Crawford, S. Žumer, J. W. Doane, and D. Finotello.
17. "Anchoring and Orientational Wetting Transitions of Confined Liquid Crystals," *Physical Review Letters* **70**, 1838-1842 (1993), G. P. Crawford, R. Ondris-Crawford, Žumer, and J. W. Doane.
18. "A Method for the Determination of K_{33}/K_{11} in Nematic Liquid Crystals," *Journal of Applied Physics* **73**, 7280-7287 (1993), A. Scharkowski, G. P. Crawford, S. Žumer, and J. W. Doane.
19. "Surface Molecular Anchoring in Microconfined Liquid Crystals Near the Nematic-Smectic A Transition," *Physical Review A* **48**, 1998-2005 (1993), R. Ondris-Crawford, G. P. Crawford, S. Žumer, M. Vilfan, I. Vilfan, and J. W. Doane.
20. "Electroclinic Materials with Large Induced Tilt Angles," *Ferroelectrics* **148**, 425-434 (1993), B. R. Ratna, G. P. Crawford, S. K. Prasad, J. Naciri, P. Keller, and R. Shashidhar.
21. "Effect of Chiral End Group Variation on the Properties of Ferroelectric Copolymers," *Ferroelectrics* **148**, 297-310 (1993), J. Naciri, G. P. Crawford, B. R. Ratna, and R. Shashidhar.
22. "Optical Determination of the Saddle-Splay Surface Elastic Constant," *Physical Review E* **49**, R978-R981 (1994), R. D. Polak, G. P. Crawford, B. Kostival, S. Žumer, and J. W. Doane.
23. "Nematic Director-Fields Captured in Polymer Networks Confined to Spherical Droplets," *Journal of Applied Physics* **75**, 1968-1971 (1994), G. P. Crawford, R. D. Polak, A. Scharkowski, S. Žumer, L. C. Chien, and J. W. Doane.
24. "Constrained Liquid Crystals and Polymer Networks: A Texture Study of Elasticity and Ordering," *Molecular Crystals Liquid Crystals* **251**, 265-269 (1994), G. P. Crawford, A. Scharkowski, R. D. Polak, J. W. Doane, and S. Žumer.
25. "Influence of the Electric Field on the Quasibookshelf Stripe Deformation in Electroclinic Liquid Crystals," *Applied Physics Letters* **65**, 2937-2939 (1994), G. P. Crawford, R. E. Geer, R. Shashidhar, J. Naciri, and B. R. Ratna.
26. "Xenon NMR Study of a Nematic Liquid Crystal Confined to Cylindrical Microcavities," *Journal of Physical Chemistry* **99**, 11989-11993 (1995), H. W. Long, M. Luzar, H. C. Gaede, R. G. Larsen, J. Ritzenberger, A. Pines, and G. P. Crawford.

27. "Novel Ferroelectric and Electroclinic Organo-Siloxane Liquid Crystals," *Chemistry of Materials* **7**, 1397-1402 (1995) J. Naciri, J. Ruth, G. P. Crawford, B. R. Ratna, and R. Shashidhar.
28. "Liquid Crystal Order in Highly Restrictive Porous Glass," *Molecular Crystals Liquid Crystals* **262**, 13-23 (1995), G. S. Iannacchione, S. Qian, G. P. Crawford, S. S. Keast, M. E. Neubert, J. W. Doane, D. Finotello, L. M. Steele, P. Sokol, and S. Žumer.
29. "The Effect of Molecular Structure on the Electrooptical Performance of Electroclinic Liquid Crystals," *Molecular Crystals Liquid Crystals* **263**, 223-232 (1995), G. P. Crawford, J. Naciri, R. Shashidhar, and B. R. Ratna.
30. "Optical Studies of Liquid Crystals Confined to Small Cylindrical Shaped Volumes," *Molecular Crystals Liquid Crystals* **262**, 25-34 (1995), J. B. Whitehead and G. P. Crawford.
31. "Surface Phenomena in Microconfined Liquid Crystals: From Cylindrical Cavities to Polymer Networks," *Molecular Crystals Liquid Crystals* **261**, 577-592 (1995), G. P. Crawford, J. W. Doane, and S. Žumer.
32. "New Fluctuation Mode in a Chiral Smectic a Liquid Crystal with a Uniaxial Layer Modulation," *Physical Review Letters* **74**, 4671-4674 (1995), S. Sprunt, J. V. Selinger, G. P. Crawford, B. R. Ratna, and R. Shashidhar.
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34. "Dynamics of a Nematic Liquid Crystal Constrained by a Polymer Network: A Proton NMR Study," *Journal of Chemical Physics* **103**, 8726-8733 (1995), M. Vilfan, I. Zupancic, I. Lahajnar, S. Žumer, R. Blinc, J. W. Doane, and G. P. Crawford.
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40. "Reflective Color LCDs Based on H-PDLC and PSCT Technologies," *Journal of the Society for Information Display* **5/3**, 45-49 (1997), G. P. Crawford, T. G. Fiske, and L. D. Silverstein.
41. "Lasing-Pixel Polymer Dispersed Liquid Crystal Light Valves for Projection Applications," *Journal of the Society for Information Display* **5/4**, 383-385 (1997), N. M. Lawandy, J. A. Firehammer, S. D. Vartak, and G. P. Crawford.

42. "Order and Dynamics in Paranematic Surface Layers," *Molecular Crystals Liquid Crystals* **290**, 193-202 (1997), S. Žumer, P. Ziherl, and G. P. Crawford.
43. "Microconfined Liquid Crystals: Surface Induced Deformations, Ordering and Fluctuations," *Molecular Crystals Liquid Crystals* **304**, 477-494 (1997), S. Žumer, A. Borstnik, G. Skacej, P. Ziherl, and G. P. Crawford.
44. "Large Second-Order Optical Non-Linearity in a Molecular Crystal Formed from a Chiral Smectic Liquid Crystal," *Journal of Applied Physics* **83**, 2352-2359 (1998), S. Sprunt, R. E. Geer, G. P. Crawford, J. Naciri, B. R. Ratna, and R. Shashidhar.
45. "Voltage Controlled Lasing Pixels for Projection Display," *Applied Physics Letters* **71**, 590-592 (1998), N. M. Lawandy, J. A. Firehammer, and G. P. Crawford.
46. "Dual Domain Reflection from Holographically Formed Polymer Dispersed Liquid Crystals," *Applied Physics Letters* **74**, 3096-3098 (1999), C. C. Bowley and G. P. Crawford.
47. "Measurement of the Surface-Induced Order in Polymer Dispersed Liquid Crystals: A New Approach by NMR Relaxometry," *Physical Review E, Rapid Communications* **59**, R4757-R4757 (1999), M. Vilfan, N. Vrbancic-Kopac, B. Zalar, S. Žumer, and G. P. Crawford.
48. "Improved Dynamic Response Times in Field-Effect Liquid Crystal Devices," *Applied Physics Letters* **75**, 3264-3266 (1999), M. Escuti, C. C. Bowley, S. Žumer, and G. P. Crawford.
49. "Amplified Strain-Rate Dependence of Deformation in Polymer Dispersed Liquid Crystal Materials," *Applied Physics Letters* **75**, 1872 (1999), D. R. Cairns, G. M. Genin, A. L. Wagoner, C. L. Briant, and G. P. Crawford.
50. "Image Mode Laser Concept: Materials and Applications," *Advanced Materials* **11**, 417-420 (1999), J. A. Firehammer, N. M. Lawandy, and G. P. Crawford.
51. "Novel Microstructures from Confined Reactive Mesogens," *Molecular Crystals Liquid Crystals* **329**, 1077-1084 (1999), N. Eichenlaub and G. P. Crawford.
52. "Morphology of Holographically Formed Polymer Dispersed Liquid Crystals," *Molecular Crystals Liquid Crystals* **331**, 2069-2076 (1999), C. C. Bowley, H. Yuan, and G. P. Crawford.
53. "Lasing Pixels: A New Application for Polymer Dispersed Liquid Crystals," *Molecular Crystals Liquid Crystals* **331**, 2025-2032 (1999), J. A. Firehammer, N. M. Lawandy, and G. P. Crawford.
54. "Deuterium NMR Relaxometry Applied to Confined Liquid Crystals," *Applied Magnetic Resonance* **17**, 329-344 (1999), M. Vilfan, N. Vrbancic-Kopac, P. Ziherl, and G. P. Crawford.
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61. "Optical Strain Characteristics of Holographically Formed Polymer Dispersed Liquid Crystals Films," *Applied Physics Letters* **77**, 2677-2679 (2000), D. R. Cairns, C. C. Bowley, S. Danworaphong, A. K. Fontecchio, G. P. Crawford, Le Li, and S. Faris.
62. "Yarn-Ball Polymer Microstructures: A Structural Transition Phenomenon Induced by an Electric Field," *Applied Physics Letters* **77**, 3752 (2000), P. Kossyrev and G. P. Crawford.
63. "The Birefringent Texture of Nematic Liquid Crystals Confined to Capillary Tubes with Square Cross-Sections," *Molecular Crystals Liquid Crystals* **352**, 379-389 (2000), P. A. Kossyrev and G. P. Crawford.
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65. "Effect of Monomer Functionality on Performance of Holographically-formed Polymer Dispersed Liquid Crystals," *Molecular Crystals Liquid Crystals* **352**, 399-406 (2000), A. K. Fontecchio, C. C. Bowley, H. Yuan, and G. P. Crawford.
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68. "Switching Dynamics of Solid Polymer Microspheres with Captured Mesogenic Order," *Applied Physics Letters* **78**, 2643-2645 (2001), D. R. Cairns, M. Sibulkin, and G. P. Crawford.
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The following patents were donated to Brown University by General Motors because of my research program and my expertise in the field of displays and liquid crystals and polymer dispersions:

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104. "New Carbon Nanoforms Based on Disk-Rod Assemblies of Lyotropic Liquid Crystals for Potential Display Applications," *Society for Information Display*, Seattle, WA (2004).
105. "Holographic Polymer Dispersed Liquid Crystal Displays: A New Model of Formation Kinetics," *Society for Information Display*, Seattle, WA (2004).
106. "Novel Carbon Nanotubes Based on Disc-Rod Assemblies of Lyotropic Liquid Crystals," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 399 (2004), M. E. Sousa, C. Chan, K. Jian, Y. Gao, N. Yang, and G. P. Crawford.
107. "Opto-Mechanics of Non-Crystallized Lyotropic Liquid Crystals on Flexible Substrates," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 263 (2004), S. Gorkhali, M. Paukshto, and G. P. Crawford.
108. "Holographically Formed Polymer Dispersed Liquid Crystals using Ferroelectric Liquid Crystals," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia (2004), J. N. Eakin, M. Radcliffe, and G. P. Crawford.
109. "Four-Domain Twisted Nematic Liquid Crystal Display by Micro-Rubbing on Homeotropic Polyimide," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 201 (2004), S. Varghese, C. Bastiaansen, G. P. Crawford, and D. Broer.
110. "Electronically Switchable Mesoscale Lattices: From Photonic Crystals to Quasi-Crystal Lattices," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 161 (2004), G. P. Crawford.
111. "Optical Diffraction Properties of Polymer Dispersed Liquid Crystals Sandwiched by Interdigitated Electrodes," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 815 (2004), I. Drevensek Olenik, M. E. Sousa, G. P. Crawford, and M. Copic.

112. "Electrically Switchable Two-Dimensional Penrose Quasi-Crystal," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 261 (2004), S. Gorkhali and G. P. Crawford.
113. "Ordering in Anisotropic Polymer Dispersed Liquid Crystal Films using ^2H -NMR Studies," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 656 (2004), I. Amimori, J. N. Eakin, G. Skacej, S. Žumer, and G. P. Crawford.
114. "Vanishing Thresholds in Periodically Aligned Liquid Crystals," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 787 (2004), J. N. Eakin, M. Radcliffe, Y. Xie, R. Pelcovits, and G. P. Crawford.
115. "Reflective Displays Based on Temporally Multiplexed Total Internal Reflection Holographic-Polymer Dispersed Liquid Crystals," *International Liquid Crystal Conference Book of Abstracts* **833**, Ljubljana, Slovenia, 259 (2004), J. Qi, M. E. Sousa, and G. P. Crawford.
116. "Systematic Molecular Control of Graphene Layer Orientation in Films and Porous Carbons," *International Conference on Carbon Book of Abstracts* **67**, Providence, RI (2004), K. Jian, H. Xianyu, Y. Gao, N. Yang, G. P. Crawford, and R. Hurt.
117. "Liquid Crystal Engineering of Carbon Nanofibers and Nanotubes," *International Conference on Carbon Book of Abstracts* **97**, Providence, RI (2004), C. Chan, K. Jian, N. Yang, Y. Gao, M. Sousa, H. Li, B. Sheldon, G. P. Crawford, and R. Hurt.
118. "Pitch Wetting on Model Basal and Edge-Plane Surfaces," *International Conference on Carbon Book of Abstracts* **97**, Providence, RI (2004), P. Wapner, K. Jian, Y. Gao, G. P. Crawford, R. Hurt, and W. Hoffman.
119. "Four-Domain Vertical Alignment in Liquid Crystal Displays for Television Applications," *Society for Information Display Digest of Technical Papers*, Boston, MA (2005), S. Varghese, G. P. Crawford, C. W. M. Bastiaansen, D. J. Broer, and D. K. G. de Boer.
120. " ^2H -NMR Study of Nanohorn Doped Liquid Crystals for Improved Dynamic Response in Liquid Crystal Displays," *Society for Information Display Digest of Technical Papers*, Boston, MA (2005), S. J. Woltman and G. P. Crawford.
121. "Optomechanical Performance of Thin Film Crystal Polarizers Coated on Polymer Substrates for Flexible Displays," *Society for Information Display Digest of Technical Papers*, Boston, MA (2005), F. Y. Biga and G. P. Crawford.
122. "Printable Reflective Color Filter Arrays from Cholesteric Reactive Mesogen Nanoposts," *Society for Information Display Digest of Technical Paper*, Boston, MA (2005), M. E. Sousa and G. P. Crawford.
123. "A Novel Medical Diagnostic Tool for Non-Invasively Measuring Hemoglobin Utilizing Switchable H-PDLC Display Technology," *Society for Information Display Digest of Technical Papers*, Boston, MA (2005), J. W. McMurdy, G. D. Jay, and G. P. Crawford.
124. "Holographic Polymer Dispersed Ferroelectric Liquid Crystals for Diffractive Optical Elements," *Proceedings of the Society for Information Display International Display Research Conference*, Kent State University, Kent, OH (2006), J. N. Eakin, S. J. Woltman, S. Žumer, and G. P. Crawford.
125. "Using Display Configurations in Spectro-Photometric Bruise Aging Applications," *Proceedings of the Society for Information Display International Display Research Conference*, Kent State University, Kent, OH (2006), J. W. McMurdy, S. J. Duffy, and G. P. Crawford.

126. "Flexible Electrodes Compatible with Standard Photolithography," *Proceedings of the Society for Information Display International Display Research Conference*, Kent State University, Kent, OH (2006), F. Biga, D. P. Wang, A. Zaslavsky, and G. P. Crawford.
127. "Monolithic Microspectrometers for Routine and Rapid Display Performance Characterization " *Proceedings of the Society for Information Display International Display Research Conference*, Kent State University, Kent, OH (2006), J. W. McMurdy, G. P. Crawford, and G. D. Jay.
128. "Lasing Nano-Sized Fibrils with Helical Molecular Symmetry," *Proceedings of the Society for Information Display International Display Research Conference*, Kent State University, Kent, OH (2006), E. Kulla, M. E. Sousa, G. D. Jay, and G. P. Crawford.

1.14. Educational Outreach Newsletter Publications

1. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **1**, 1-6 (1992), Physics of Polarization, Reflection, Indices of Refraction, and the Twisted Nematic Display, edited by R. Ondris-Crawford and G. P. Crawford.
2. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **2**, 7-12 (1992), Physics of Light Scattering and Index Matching, and the Polymer Dispersed Liquid Crystal Display, edited by R. Ondris-Crawford and G. P. Crawford.
3. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **3**, 13-20 (1993), Physics of Reflection, Symmetry, Chirality, Color and Cholesteric Liquid Crystals, edited by R. Ondris-Crawford and G. P. Crawford.
4. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **4**, 21-27 (1993), Physics of Heat, Energy, Temperature, and Cholesteric Liquid Crystals, edited by R. Ondris-Crawford and G. P. Crawford.
5. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **5**, 1-6 (1994), Experiments on Light Scattering Using Milk and a Polymer Dispersed Liquid Crystal Display, edited by R. Ondris-Crawford and G. P. Crawford.
6. *ALCOM Education Outreach*, Publication of the National Science Foundation and NSF ALCOM Center **6**, The Chromaticity Diagram and Cholesteric Liquid Crystals, edited by R. Ondris-Crawford and G. P. Crawford.

1.15. Educational Instruction & Laboratory Manuals (internal, unpublished)

1. "Liquid Crystals: Applications and Uses," Instruction and laboratory manual on liquid crystals for exceptional high school students (*Kent State University*, Kent, OH 1991), G. P. Crawford, R. J. Ondris, and J. H. Erdmann.
2. "From Mood Rings to Laptops: Liquid Crystals Made Easy," Instruction manual on liquid crystals and polymers for high school teachers (*Kent State University*, Kent, OH 1993), G. P. Crawford and R. Ondris-Crawford.
3. "Liquid Crystal Cell Fabrication," Laboratory and instruction manual on liquid crystal cell fabrication for professional scientists and engineers, (*University of California*, Los Angeles, 1992, 1993, 1994, 1995, 1996), G. P. Crawford.
4. "Flat Panel Display Materials," Special topics in Materials Science & Engineering, Collection of edited papers from Materials Engineering 297 graduate course (San Jose, CA, 1996), G. P. Crawford.

5. “Flat Panel Display Materials,” Topics in Flat Panel Display Design and Engineering, Collection of edited papers Engineering 2992-S16 graduate course (*Brown University* Providence, RI 1997), G. P. Crawford.
6. “Electro-Optics Laboratory,” Undergraduate laboratory on spatial light modulators at Brown University (*Brown University*, 1997), G. P. Crawford.
7. “Engineering: From Theory to Implementation,” Volume I: Liquid Crystal Displays and Volume II: Engineering Your Own Start-Up, Summer Focus Program (*Brown University*, 1997). G. P. Crawford.
8. “Engineering and the World of the High Tech Entrepreneur,” Volume I: Liquid Crystal Displays and Volume II: Engineering Your Own Start-Up, Summer Focus Program (*Brown University*, 1998). G. P. Crawford.

2. EXTERNAL FUNDING

2.1. Federal Funding

1. “Investigations of Ordered Polymer Microstructures Formed by Molecular and Mesoscopic Self Assembly” (**\$386,425**, National Science Foundation, 5 years, completed).
2. “Orientational Phenomena in Homeotropic Liquid Crystal Films” (**\$75,000**, National Science Foundation, 3 years, completed).
3. “Novel Submicrometer Ordered Polymer Fibers and Tubes” (**\$43,314**, National Science Foundation MRSEC, 1 year, completed).
4. “Entrepreneurial Engineering Program: Innovative Incubator Sequence” (w/Suuberg, **\$280,000**, National Science Foundation, 3 years, completed).
5. “Development of CD ROM Electronic Information Display Tutorial” (**\$50,000**, United States Display Consortium, 2 years, completed).
6. “Phase Separation and Self Assembly of Liquid Crystals and Polymer Dispersions” (w/Whitehead, **\$162,043**, National Aeronautics and Space Administration, 4 years, completed).
7. “NdYag Laser for Manipulation of Microstructures” (**\$26,803**, National Science Foundation, 1 year, completed).
8. “Modular Tiered Agile Beam Steering Device (w/Raytheon Corporation, **\$220,000**, Defense Advanced Research Projects Agency DARPA, 2 years, completed).
9. “Mechanical Studies of Stained Polymer Film (**\$3,000**, United States Navy, 1 month, completed).
10. “Acquisition of Solid State NMR” (**\$304,000**, National Science Foundation, 1 year, completed).
11. “Entrepreneurship Research Experience for Teachers” (**\$10,000**, National Science Foundation, 1 year, completed).
12. “Travel for Medium Term Stay in Netherlands for Ph.D. Students” (**\$25,000**, National Science Foundation, 1 year, completed).
13. “Investigations of Electro-Optics and Opto-Mechanics of ITO on Plastic Substrates for Flexible Display Applications” (approximately **\$200,000**, National Science Foundation MRSEC Center, 5 years, completed).

14. “Tough Nanocomposite Coatings Using New Self Organized Carbon Films” (w/ Hurt, Curtin, & Sheldon, **\$1,100,000**, NIRT National Science Foundation, 4 years, completed).
15. “Switchable Mesoscale Lattices for Photonics” (**\$255,000**, National Science Foundation, 3 years, completed).
16. “Nano and Microscale Templating in Liquid Crystal Materials” (**\$112,118**, National Science Foundation, 3 years, completed).
17. “Micropatterned Nanotopography Chips for Probing the Cellular Basis of Biocompatibility and Toxicity” (w/Hurt, Morgan, Cane, **\$1,844,543**, NIRT National Science Foundation, 4 years, completed).
18. “Gordon Research Conference on Liquid Crystals” (Chair, **\$10,000**, National Science Foundation, 1 year, completed).
19. “Gordon Research Conference on Liquid Crystals” (Chair, **\$10,000**, National Institutes of Health, 1 year, completed).
20. “GK-12 STEM Education” (w/Haberstroh, Targen, Tucker and Herbert, **\$3,000,000**, National Science Foundation, 5 years, completed)
21. “Thermally Responsive Surface Topologies from Patterned Reactive Mesogens” (**\$300,000**, National Science Foundation, 3 years, completed).

2.2 Industry Funding

1. “An Electrically Controllable Lasing Device” (**\$11,000**, Spectra Science Corporation, 1 year, completed).
2. “Holo-graphically Formed Polymer Dispersed Liquid Crystal Materials for Flat Panel Display Applications” (**\$120,000**, Xerox Corporation, 2 years, completed).
3. “Voltage Holding Ratio” (**\$10,000**, Corning, 1 year, completed).
4. “Deformed Helix Ferroelectric Liquid Crystal Spatial Light Modulator” (**\$5,000**, Optron Imaging Systems, 1 year, completed).
5. “Electrically Switchable Bragg Gratings for Switchable Window and Color Filter Applications” (**\$60,000**, Reveo, 1 year, completed).
6. “Electrically Controllable Bragg Gratings” (**\$60,000**, Reveo, 1 year, completed).
7. “Switchable Mirolenses Using H-PDLCs” (**\$30,000**, Foster-Miller Incorporation, Phase I SBIR Air Force, 1 year, completed).
8. “Reactive Mesogen Studies Targeted at Reflective Polarizer Application” (**\$60,000**, 3M, 1 year, completed).
9. “Ferroelectric Spatial Light Modulators” (**\$5,000**, Optron Imaging Systems, 1 year, completed).
10. “Indium Tin Oxide on Plastic Substrates” (**\$5,000**, Microtouch Incorporated, 1 year, completed).
11. “Holographic PDLC Waveguide Devices” (**\$578,492**, Digilens Incorporated, 2 years, completed).
12. “UV Laser for H-PDLC Formation” (**\$55,000**, Digilens Incorporated, 1 year, completed).
13. “Spectral Imaging Using Fast Electrically Tunable Filters” (**\$40,000**, Optoknowledge, Phase I STTR NASA, 1 year, completed).

14. “Ferroelectric Liquid Crystals for Phase and Amplitude Modulators” (**\$36,000**, Radiant Imaging Systems, Phase II SBIR Army, 2 years, completed).
15. “Mechanics of Flexible Substrates Coated with ITO” (**\$20,000**, Microtouch Corporation, 1 year, completed).
16. “Reflective Polarizes Based on Strained Polymer Films” (**\$10,000 plus fully funded graduate student for two years**, Fuji Film, 1 year, completed).
17. “Reflective Display Technology and Training” (**\$3,000**, Xerox Corporation, 1 week, completed).
18. “Ferroelectric Gratings for Applications” (**\$70,000**, 3M, 1 year, completed).
19. “Rotatable Gratings” (**\$65,000**, Reveo, 1 year, completed).
20. “Circle to Point Converter for Telecommunication Applications” (**\$35,000**, Scientific Solutions, Phase I SBIR MDA, 1 year, completed).
21. “Circle to Point Converter for NASA Applications” (**\$20,000**, Scientific Solutions, Phase I SBIR NASA, 1 year, completed).
22. “H-PDLC for Hyperspectral Sensing Applications” (**\$170,000**, Optoknowledge Incorporated, Phase II STTR NASA, 2 years, completed).
23. “Circle to Point Converter for NASA Applications” (**\$200,000**, Scientific Solutions, Phase II SBIR NASA, 2 years, completed).
24. “Optical Switching Technology for Telecommunications” (**\$75,000**, 3M, 1 year, completed).
25. “Discotic Liquid Crystal Polarizer Technology for Liquid Crystal Displays” (**\$37,500**, Optiva Corporation, 6 months, completed).
26. “A Tunable Interferometric Random Optical Cross Switch” (**\$196,000** Scientific Solutions, Phase II SBIR BMDO, 2 years, completed).
27. “Switchable Lasers from Photonic Crystals” (**\$22,000**, Scientific Solutions, Phase I SBIR from NASA, 1 year, completed).
28. “Cognitive Systems for Materials Research and Development” (w/Porad, Chawla, Pitera, and Spohrer, **\$60,000**, IBM Seed proposal, 1 year, current).

2.3. State Funding

1. “Development of Digital Laser Projection System for Large Screen Theater” (**\$200,000**, Samuel Slater Innovative Partnership Fund, 1 year, completed).
2. “Creating a Reliable, Fast and Affordable Way to Diagnose Anemia” (w/Jay & Suner, **\$170,000**, Rhode Island Science and Technology Advisory Council, 2 years, completed).

2.4. Foundation Funding

1. “Basic Studies on Novel Polymer Microstructures with Spherical and Cylindrical Symmetry” (**\$60,000**, Petroleum Research Fund, 2 years, completed).
2. “Entrepreneurship Curriculum” (w/ Plater, **\$24,500**, Lemelson Foundation, 1 year, completed).
3. “Basic Studies of Discotic Liquid Crystals” (w/Hurt, **\$60,000**, Petroleum Research Fund, 2 years, completed).

4. "Non-Invasive Device to Measure Hemoglobin Levels" (**\$25,000**, Culpepper Foundation, 1 year, completed).
5. "Student Entrepreneurship through Interaction with Physicians – A Problem Selection Paradigm" (w/ Suuberg, **\$35,000**, Lemelson Foundation, 1 year, completed).
6. "Dynamic Anchoring of Liquid Crystals at Fluid Interfaces" (w/Pelcovits, **\$100,000**, Petroleum Research Fund, 2 years, completed).
7. "Combining Spectrophotometry and Multiscale Modeling to Assess Bruising Complexity (w/Alber, **\$180,000**, Gerber Foundation, 1 year, completed).
8. "Enhancing Entrepreneurship, Research and Access" (**\$2,000,000**, Kauffman Foundation, *Selected for funding but Brown University could not accept the terms of the agreement so the grant was never executed).
9. "A New, Holistic Paradigm for Undergraduate STEM Education: Inspiring Big Questions and Cultivating Virtuous Scientists" (w/Chaloner, **\$194,562**, Templeton Foundation, 1 year, in progress, through 2015).

2.5. Active Participant/Research Member

1. "Member of the Center for Micro- and Nano-Mechanics of Electrical and Structural Materials" (PI: Prof. William Curtin, Director, ~**\$9,000,000**, National Science Foundation, 6 years, completed).
2. "Member of the Center for Micro- and Nano-Mechanics of Electrical and Structural Materials (PI: Prof Clyde Briant, Director, **\$9,827,573**, National Science Foundation, 5 years, completed).
3. "Acquisition of a Workhorse Electron Beam Lithography System for Microstructural Research and Device Research" (PI: Prof Sean Liang, **\$151,200**, National Science Foundation, 1 year, completed).
4. "Acquisition of a Variable Pressure Scanning Electron Microscope" (PI: Clyde Briant and David Paine, **\$447,793**, National Science Foundation, 1 year, completed).

3. PRESENTATIONS

3.1. Research and Entrepreneurship Presentations (Selected)

1. "Surface Anchoring and Elastic Properties of Confined Liquid Crystals," Presentation for 1994 International Glenn H. Brown Award for Outstanding Doctoral Thesis at the *15th International Liquid Crystal Conference*, Budapest, Hungary (July 1994).
2. "Polymer Network Assemblies in Liquid Crystals: Physics and Applications," Condensed Matter Physics Seminar, *University of Illinois*, Urbana-Champaign, IL (September 1995).
3. "Polymer Network Assemblies in Ordered Environments," CPIMA Seminar, Center for Polymer Interfaces and Macromolecular Assemblies, *Stanford University*, Stanford, CA (February 1996).
4. "Polymer Network Assemblies in Liquid Crystals: Structure and Applications," Physics Seminar, *University of North Carolina*, Chapel Hill, NC (February 1996).
5. "Polymer Network Assemblies in Liquid Crystals: Structure and Applications," Physics Seminar, *University of Arizona*, Tucson, AZ (March 1996).
6. "Reflective and Transmissive Liquid Crystal Displays," *Corning Incorporated*, Sullivan Park, Corning, NY (November 1996).

7. "Holographically Formed Liquid Crystal Displays and Lasing Pixel Configurations," *Wright Patterson Air Force Base*, Hardened Materials Branch, Dayton, OH (March 1997).
8. "Holographic Reflective Displays and Lasing Pixel Projection," Seminar Series on Optics and Quantum Electronics, *Massachusetts Institute of Technology*, Cambridge, MA (March 1998).
9. "Novel Microstructures from Confined Reactive Mesogens," *17th International Liquid Crystals Conference*, Strasbourg, France (July 1998) [poster].
10. "Polymer Networks and Dispersions for Display Applications," Department of Physics and Chemistry, *University of Southern Mississippi*, Hattiesburg, MS (September 1998).
11. "Reflective Displays from Holographically Formed Polymer Dispersed Liquid Crystals and Novel Microstructures from Reactive Mesogens," Electrical Engineering Colloquium, *Princeton University*, Princeton, NJ (October 1999).
12. "Holographically Formed Polymer Dispersed Liquid Crystals," *Rhom and Haas Company*, Philadelphia, PA (June 2000).
13. "Engineering Entrepreneurship at Brown University," *National Science Foundation Symposium on Engineering Reform*, Washington, D.C. (October 2000).
14. "Electrically Switchable Gratings for Display and Telecommunications Applications," *University of Massachusetts-Amherst*, Amherst, MA (April 2001).
15. "Holographically Formed Polymer Dispersed Liquid Crystals for Telecommunication Applications," Department of Physics, *University of Ljubljana*, Ljubljana, Slovenia (March 2002).
16. "Mesoscale Lattices in Polymer Dispersed Liquid Crystals," Seminar, *ENST-Brest* (Graduate School for Telecommunications), Brest, France (August 2003).
17. "Ordered Polymer Microstructures Fabricated from Reactive Mesogen Materials," Keynote Address, Advances in Polymer Technology, *Cochin University*, India (January 2004).
18. "University Entrepreneurship: from Graduate Student to CEO," *Fudan University*, Shanghai, China (March 2004).
19. "Carbon Nanofibrils and Nanotubes from Lyotropic Liquid Crystals," *University of Bologna*, Bologna, Italy (March 2004).
20. "Electrically Switchable Grating Devices," *University of Nijmegen*, Nijmegen, Netherlands (April 2004).
21. "Novel Electrically Switchable Diffractive Devices – Photonic Crystals," *Chalmers University*, Gothenburg, Sweden (June 2004).
22. "Micro-Patterned Alignment of Liquid Crystals," *University of Stuttgart*, Stuttgart, Germany (July 2004).
23. "From Graduate Student to CEO: Student Entrepreneurship," *Queen Mary College, University of London*, London, (July 2004).
24. "Mechanical Properties of Inorganic and Organic Conductors on Flexible Substrates," *Akzo Nobel*, Arnhem, The Netherlands (July 2004).
25. "Liquid Crystal Display Components," *DSM*, Geleen, The Netherlands (August 2004).
26. "Switchable Photonic Crystals," *InventQjaya*, Cyberjaya, Malaysia (October 2004).

27. “New Thrusts in Liquid Crystal Research: Nanotechnology and Medical Devices,” *University of Alberta*, Edmonton, Alberta, Canada (August 2005).
28. “Biomedical Device to Measure Hemoglobin,” *Teijin Films*, Tokyo, Japan (August 2005).
29. “High-Tech Entrepreneurship: Ideas, Risk, Return, Product Design and the Fuzzy Front End,” Tuck Business School, *Dartmouth College*, Hanover, NH (January 2006).
30. “Flexible Flat Panel Displays,” *Society for Information Display, Texas Chapter*, Austin, TX (January 2006).
31. “High Technology Entrepreneurship: From Conception to Venture,” *SPIE Photonics West Conference*, San Jose, CA (January 2006).
32. “Enhancing Entrepreneurship Education, Research, and Access,” *Kauffman Foundation*, Kansas City, MO (December 2006).
33. “Engineering and Medicine: Top Down Approach to Translational Research,” *GE Research Labs*, Schenectady, NY (December 2006).
34. “Determination of HgB Using Portable Spectroscopic Devices,” *Stanford University*, Palo Alto, CA (April 2007).
35. “Physician-Scientist Collaborations Working in Pasteur’s Quadrant: Solving Medical Problems with Spectroscopy and Liquid Crystals,” *3M*, St. Paul, MN (May 2009).
36. “Transformation, Change and the Role of the Contemporary Scientist,” Hasbro Exploration Day, *Hasbro, Inc.*, Pawtucket, RI (September 2009).
37. “High Technology Entrepreneurship: From Conception to Venture,” *University of Puerto Rico Medicine School*, San Juan (September 2009).
38. “Starting a Biotechnology Company from a University Invention,” *Philips Research Laboratory*, Netherlands (January 2010).
39. “Cancer Research at Notre Dame,” *Northern Indiana Clinical Oncology Group*, Memorial Hospital, South Bend, IN (February 2010).
40. “Aging Bruises—Tracking Extravascular Hemoglobin,” *El Colegio Nacional*, Mexico City, Mexico (February 2011).
41. “Catalyzing Change: Resourcing the Gaps, Bringing Continuity to Path of Progress,” *Economic Development Corporation of Elkhart County*, Elkhart, IN (August 2011).
42. “Biomedical Applications Through Spectroscopy: Non-Invasive HgB, Fetal Twin Transfusion, and Aging Bruises,” *Kent State University*, Kent, OH (September 2011).
43. “Entrepreneurship: The Role of Entrepreneurship in the Academy,” *Bradley University*, Peoria, IL (October 2012).
44. “Translational Research at Notre Dame: HgB Determination in Many Applications,” *Saint Joseph Regional Medical Center*, Mishawaka, IN (January 2013).
45. “Assessing the Age of a Bruise: HgB Determination in Bruising Applications,” *Child Abuse Services, Investigations and Education Center (CASIE)*, South Bend, IN (April, 2014).

3.2. Alumni Club Presentations

1. “Thinking Big to the Unimaginably Small: Innovations in Brown Engineering,” *New York City Brown Club*, New York City (November 2006).
2. “Bedside Synergy: Engineers and Physicians on the Edge,” Brown University Alumni Club, Cleveland, OH (March 2007).
3. “Bedside Synergy: Engineers and Physicians on the Edge,” Brown University Alumni Club, Palo Alto, CA (March 2007).
4. “Thinking Big to the Unimaginably Small,” Brown University Alumni Club, Columbus, OH (October 2007).
5. “Science in a Changing World,” Notre Dame Alumni Club, Minneapolis, MN (October 2009).
6. “Desert to Dome: Fighting Rare Disease,” Note Dame Alumni Club, Tulsa, OK (August 2010).
7. “Pasteur’s Quadrant: From the Lab Bend to Patient Bedside,” Notre Dame Alumni Club, Houston, TX (February 2011).
8. “The Role of Entrepreneurship in the Academia: Pursuit of Opportunity,” Notre Dame Alumni Club, Jersey Shore, NJ (October 2011).
9. “Road to Discovery I: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Knoxville, TN (July 2011).
10. “Road to Discovery I: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Littlerock, AR (July 2011).
11. “Road to Discovery II: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Omaha, NE (July 2012).
12. “Road to Discovery II: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Denver, CO (July 2012).
13. “Entrepreneurship: The Role of Entrepreneurship in the Academy,” Notre Dame Alumni Club, Spokane, WA (December 2012).
14. “Science Serving Society,” Universal Notre Dame Night, Vero Beach, FL (March 2013).
15. “Science Serving Society,” Universal Notre Dame Celebration, Orlando, FL (April, 2013).
16. “Science for Society,” Sorin Society Event, San Diego, CA (May, 2013).
17. “Road to Discovery III: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Dallas, TX (July 2013).
18. “Road to Discovery III: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Mobile, AL (July 2013).
19. “Road to Discovery III: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Atlanta, GA (July 2013).
20. “Road to Discovery III: Our Fight Against Rare Diseases,” Notre Dame Alumni Club, Charleston, SC (July 2013).
21. “Research and Entrepreneurship: Resourcing the Gaps, Bringing Continuity to the Path of Progress,” Hesburgh Lecture, Nashville, TN (November, 2013).

22. “Research at Notre Dame: College of Science,” Universal Notre Dame Night, Gettysburg, PA (June 2014).
23. “Research and Entrepreneurship: Resourcing the Gaps, Bringing Continuity to the Path of Progress,” Hesburgh Lecture, San Francisco, CA (September 2014).
24. “Research and Entrepreneurship: Resourcing the Gaps, Bringing Continuity to the Path of Progress,” Hesburgh Lecture, San Jose, CA (September 2014).
25. “The Hesburgh Legacy and the California Initiative,” Hesburgh Lecture Series, Orange Country, CA (July, 2015).
26. “Notre Dame California,” Notre Dame Business Alumni Club, Chicago, IL (October 2015).
27. “Research and Entrepreneurship: Resourcing the Gaps, Bringing Continuity to the Path of Progress,” Hesburgh Lecture, San Jose, CA (October 2015).
28. “Research and Entrepreneurship: Resourcing the Gaps, Bringing Continuity to the Path of Progress,” Hesburgh Lecture, Chico, CA (October 2015).

3.3. Technical Workshop Presentations (Instructor)

1. “Practical Liquid Crystals,” Instructor, Laboratory Session on Microscopy and Electrooptic Responses, *Liquid Crystal Institute* (May 31-June 2, 1989).
2. “Practical Liquid Crystals: Materials and Display Devices,” Instructor, Laboratory Session on Display Cell Analysis, *Liquid Crystal Institute* (May 31-June 2, 1989).
3. “Practical Liquid Crystals,” Instructor, Laboratory Session on Microscopy and Electrooptic Responses, *Liquid Crystal Institute* (May 30-June 1, 1990).
4. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (April 22-May 2, 1992).
5. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 8-12, 1993).
6. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 6-10, 1994).
7. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 1-6, 1995).
8. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 12-16, 1996).
9. “Liquid Crystal Displays: A Technical Overview,” Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 24-28, 1996).
10. “Liquid Crystal-Polymer Dispersions: Reflective Flat Panel Displays,” Short Course Seminar, *Society for Information Display (SID) Instructional Seminar Series*, San Diego, CA (May 1996).

11. "Flat Panel Displays for Imaging Applications," *IS&T 50th Annual Conference*, Short Course Seminar and Workshop, Cambridge, MA (May 1997).
12. "Liquid Crystal Displays: A Technical Overview," Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 1998).
13. "The Future of Liquid Crystal Display Technology," Short Course for IEEE Providence Section, *Brown University*, Providence, RI (January 1998).
14. "Reflective Liquid Crystals Displays," Discussions and Demonstrations of reflective displays for Comtec employees, *Comtec, Inc.*, Warwick, RI (June 1998).
15. "Liquid Crystal Displays: A Technical Overview," Instructor, Liquid Crystal Displays Laboratory Session, *University of California Los Angeles (UCLA)*, Los Angeles, CA (February 1999).
16. "Liquid Crystal Displays: A Technical Overview," Instructor, Liquid Crystal Displays Laboratory Session, *Sony Corporation*, San Diego, CA (March 2000).
17. "Liquid Crystal Displays: A Technical Overview," Instructor, Liquid Crystal Displays Laboratory Session, *Sony Corporation*, San Diego, CA (August 2000).
18. "Liquid Crystal Materials and Displays," Instructor, *3M Norwood* (formally *Polaroid*), Norwood, MA (August 2000).
19. "Liquid Crystal Materials and Displays," Instructor, *3M Company*, St. Paul, MN (August 2000).
20. "Liquid Crystal Display Materials," Instructor, *Society for Information Display Conference*, San Jose, CA (June 2001).
21. "Liquid Crystal Grating Technology," *Telecommunications Workshop*, Boulder, CO (June 2001).
22. "Liquid Crystals Display Materials," *Technical University of Eindhoven*, Eindhoven, Netherlands (February 2002).
23. "Liquid Crystal Display Materials," Instructor, Society for Information Display Conference, Boston, MA (May 2002).
24. "Liquid Crystal Materials and Displays Workshop," Instructor, *United States Patent and Trademark Office (USPTO)*, Arlington, VA (June 2002).
25. "A Twisted Nematic LCD Workshop," *New England Chapter for the Society for Information Display*, Providence, RI (September 2002).
26. "Liquid Crystal Materials and Displays," *Asia Society for Information Display*, Singapore (September 2002).
27. "Liquid Crystal Materials and Devices," Instructor, *15th Annual IS&T/SPIE Imaging Conference*, Santa Clara, CA (January 2003).
28. "Liquid Crystal Materials and Displays," Instructor, *International Display Manufacturing Conference (IDMC)*, Taipei Taiwan (February 2003).
29. "Liquid Crystal Materials and Displays," Instructor, *Society for Information Displays*, Baltimore, MD (May 2003).
30. "Liquid Crystal Materials and Optical Properties," Instructor, *Display Winter School 2004*, Hsinchu, Taiwan (2004).

31. “Workshop on Liquid Crystal Materials and Display Devices,” *Fudan University*, Shanghai, China (2004).
32. “Flexible Flat Panel Displays,” Instructor, *Society for Information Displays*, Seattle WA (2004).
33. “Liquid Crystal Materials and Flexible Flat Panel Displays,” *RPK*, Utrecht, Netherlands (2004).
34. “Flexible Flat Panel displays,” *Cyberjaya*, Malaysia (2004).
35. “Liquid Crystal Materials and Displays,” *Cyberjaya*, Malaysia (2004).
36. “Flexible Flat Panel Displays,” Instructor, *3M*, St. Paul, MN (2005).
37. “Flexible Flat Panel Displays,” Instructor, *Society for Information Display*, Boston, MA (2005).
38. “Flexible Flat Panel Displays,” Instructor, *Teijin Films*, Tokyo, Japan (August 2005).
39. “Liquid Crystal Displays,” Instructor, *United States Patent and Trademark Office*, Alexandria, Virginia (February 2007).
40. “Liquid Crystal Displays,” Instructor, *United States Patent and Trademark Office*, Alexandria, VA (February 2007).
41. “Liquid Crystal Displays,” Instructor, *United States Patent and Trademark Office*, Alexandria, VA (February 2008).
42. “Liquid Crystal Displays,” Instructor, *United States Patent and Trademark Office*, Alexandria, VA (March 2009).

3.4. Entrepreneurship Workshop Presentations (Instructor)

1. “Workshop on Entrepreneurship: From Graduate Student to CEO,” *Technical University of Eindhoven*, Eindhoven, Netherlands (2004).
2. “Workshop on Entrepreneurship,” *Fudan University*, Shanghai, China (2004).
3. “Conception to Venture,” *SPIE Conference*, San Jose, CA (2006).
4. “Workshop on High Technology Entrepreneurship,” *University of Puerto Rico-Mayaguez* (April 2009).
5. “Workshop on High Technology Entrepreneurship,” *University of Puerto Rico-Humacao* (April 2009).
6. “Workshop on High Technology Entrepreneurship,” *University of Puerto Rico Medicine School, San Juan* (September 2009).

3.5. Educational Workshops Presentations (Instructor)

1. “Liquid Crystals, Fundamentals and Applications,” Liquid crystal course for gifted high school students (July 1989), G. P. Crawford, J. H. Erdmann, and R. J. Ondris.
2. “Liquid Crystals: Fundamental Properties and Applications,” *Creative Connections Institute* (July 1991), R. J. Ondris-Crawford and G. P. Crawford.
3. “Fabrication of a Liquid Crystal Light Shutter,” Local Physics Alliance, *University of Akron*, Akron, OH (April 1992), R. J. Ondris-Crawford and G. P. Crawford.
4. “Construction of a Twisted Nematic Liquid Crystal Display,” *Creative Connections Institute* (July 1992), R. J. Ondris-Crawford and G. P. Crawford.

5. "Liquid Crystal Displays: Past, Present and Future," Operation Chemistry, *Kent State University*, Kent, OH (July 1992), R. J. Ondris-Crawford and G. P. Crawford.
6. "Twisted Nematics and Polarization of Light," Local Physics Alliance, *Hudson High School*, Hudson, OH (September 1992), R. J. Ondris-Crawford and G. P. Crawford.
7. "Make It, Take It Workshop I," Liquid crystal course for science education undergraduates, *ALCOM Center* (September 1992), R. J. Ondris-Crawford and G. P. Crawford.
8. "Hands-On Liquid Crystal Workshop," South Mississippi Alliance for Physics, *University of Southern Mississippi*, Hattiesburg, MS (November 1992) G. P. Crawford and J. B. Whitehead.
9. "Fabrication of a Twisted Nematic Display," Upper class physics students, *Wooster College*, Wooster, OH (December 1992), R. J. Ondris-Crawford and G. P. Crawford.
10. "Demonstrations of Liquid Crystal Technologies and the Exciting Science Behind Their Operation," *West Geauga Middle School*, West Geauga, OH (December 1992) R. Ondris-Crawford and G. P. Crawford.
11. "Liquid Crystals," *Fishcreek Elementary School*, Stow, OH (January 1993), R. J. Ondris-Crawford and G. P. Crawford.
12. "Colorful Science," Boy Scouts of America (~ 2nd grade level), *Liquid Crystal Institute*, Kent, OH (February 1993), R. J. Ondris-Crawford and G. P. Crawford.
13. "Liquid Crystals: A Window to the Future," Ohio high school teachers at *Science Education Council of Ohio (SECO) convention*, Cleveland, OH (February 1993), R. J. Ondris-Crawford and G. P. Crawford.
14. "A Colorful Twist to Physics," Youngstown Area Physics Sharing Session, Boardman, OH (March 1993), R. J. Ondris-Crawford and G. P. Crawford.
15. "A Twisted State of Matter," Portage County Science Fair Celebration of Science, *Northeastern Ohio Universities College of Medicine (NEOUCOM)*, Rootstown, OH (March 1993) G. P. Crawford and R. Ondris-Crawford.
16. "From Mood Rings to Laptops: Liquid Crystals Made Easy," National workshop for high school physics teachers, *ALCOM Center* (June 1993), R. J. Ondris-Crawford and G. P. Crawford.
17. "Liquid Crystal Displays from Wristwatches to Thermometers," *Creative Connections Institute* (July 1993), R. J. Ondris-Crawford and G. P. Crawford.
18. "A Twisted and Colorful State of Matter," *Rockville Science Day*, Rockville, MD (April 1994), R. J. Ondris-Crawford and G. P. Crawford.
19. "Liquid Crystals: Molecules at Work," *National Science Foundation Family Night*, Arlington, VA (April 1994), R. J. Ondris-Crawford and G. P. Crawford.
20. "Liquid Crystals and Thermal Devices," *National Science Foundation* presentation, Arlington Library, Arlington, VA (July 1994), G. P. Crawford and R. J. Ondris-Crawford.
21. "Using Liquid Crystals to Teach Basic Concepts of Optics," *American Association of Physics Teachers Summer Meeting*, University of Notre Dame, Notre Dame, IN (August 1994).
22. "Cholesteric Liquid Crystals: A Twisted State of Matter," *American Association of Physics Teachers Summer Meeting*, University of Notre Dame, Notre Dame, IN (August 1994).

23. "The Optics of Liquid Crystal Displays: Molecules at Work," *5th Annual Northeast Regional American Association of Physics Teachers*, Pennsylvania State University-Ogontz, Ogontz, PA (October 1994).
24. "Liquid Crystals," Father/Son Breakfast Meeting, *St. Mary's School*, Rockville, MD (October 1994).
25. "Cholesteric Liquid Crystal Thermal Devices," Vienna School District, junior high students, Vienna, VA (December 1994).
26. "Liquid Crystal Displays and Devices," Summer intern program for UC-Berkeley and MIT undergraduates, *Xerox Corporation*, Palo Alto, CA (June 1995).
27. "Flat Panel Displays: How Do They Work," Summer intern program at Xerox, Sun, and Hewlett Packard for undergraduates, *Xerox Palo Alto Research Center*, Palo Alto, CA (July 1995).
28. "Liquid Crystals: A Twisted State of Matter," Physics Department, *University of Illinois, Urbana-Champaign*, IL (September 1995).
29. "The Twisted Phase of Technology," *California Science Teachers Association (CSTA)*, San Jose, CA (September 1995).
30. "Liquid Crystal Materials & Displays," *American Association of Physics Teachers (AAPT)*, Stanford University, Stanford, CA (February 1996).
31. "Liquid Crystals: The Twisted State of Matter," Physics Department, *University of North Carolina-Chapel Hill*, Chapel Hill, NC (February 1996).
32. "Liquid Crystals Displays: Electro-optic Experiments," Physics Department, *University of Arizona*, Tucson, AZ (March 1996).
33. "Engineering and Processing of a Liquid Crystal Display," Materials Engineering Department, *San Jose State University*, San Jose, CA (March 1996).
34. "Flat Panel Display Materials," Presentation for Electrical Engineering graduate students, *dpiX*, A Xerox Company, Palo Alto, CA (April 1996).
35. "Liquid Crystal Displays," Electrical Engineering Department, *Brown University*, Providence, RI (April 1996).
36. "Liquid Crystals Materials & Displays," Summer Intern Program for the *Xerox Corporation*, *dpiX*, Palo Alto, CA (June 1996).
37. "The Industrial Scientist," *NSF Center for Polymer Interfaces and Macromolecular Assemblies (CPIMA)*, Industrial Day for summer interns, Stanford, CA (July 1996).
38. "Fabricating a Flat Panel Display Workshop," *University of Massachusetts-Dartmouth*, Laboratory for undergraduate physics majors, Dartmouth, MA (November 1996).
39. "Science and Technology Panel," *National Society for Black Engineers (NSBE)*, Brown University (February 1997).
40. "Fabricating Reflective Displays," Laboratory Course on PDLC for *University of Massachusetts* science and engineering undergraduate students, *Brown University* (April 1997).
41. "Electronic Displays," Science-Technology Fest, *East Providence High School*, East Providence, RI (May 1997).

42. "Building Your Own Display Workshop," Hands-on workshop for junior high school students, Barrington, RI (June 1997).
43. "Building an LCD," Laboratory workshop for *University of Massachusetts - Dartmouth* physics undergraduates; students designed and mechanically assembled liquid crystal light valves and evaluated performance under different conditions, including mechanical forces, *Brown University* (February 1998).
44. "Expanding your Horizons," For middle-school girls in science and engineering in RI and MA, *University of Massachusetts - Dartmouth*, Prepared 50 materials kits for the laboratory section of the symposium (March 1998).
45. "Liquid Crystals, Polymers and All That Stuff," *Barrington Middle School*, Barrington, RI, (March 1998).
46. "Color, Temperature, and the Mood Ring," Middle school students in Attleboro, MA (March 1998).
47. "Women in Technology Summer Seminar," Bristol Technical Preparation Consortium, *University of Massachusetts - Dartmouth*, 20 high school students, Prepared 20 materials kits for the laboratory section of the seminar, (July 1998).
48. "Programs in Electrical Engineering," *Brown University*, Engineering Day (October 1998).
49. "Thinking with Stuff," NSF MRSEC Program presented to local high school teachers, Lecture on color and liquid crystal displays, (May 1999).
50. "Liquid Crystal Displays and Color, Workshop I," Boys and Girls Club of Pawtucket, A MRSEC Educational Event held at *Brown University* (September 1999).
51. "Building a FM Transmitter, Workshop II," Boys and Girls Club of Pawtucket, A MRSEC Education Event held at *Brown University*, (October 1999).
52. "More on the FM Transmitter, Workshop III," Boys and Girls Club of Pawtucket, A MRSEC Education Event held at the Club in Pawtucket (October 1999).
53. "Color and the Liquid Crystal Display," *Rhode Island School for the Deaf*, A MRSEC Education Event held at *Brown University* (October 1999).
54. "Liquid Crystal Research at Brown University," National Society for Black Engineers (NSBE), Technical Research Forum, *Brown University* (October 1999).
55. "Liquid Crystal Displays and Color," The Bridge Alternative School, a school for suspended and expelled high school students in Providence, A MRSEC Education Event held at *Brown University* (November 1999).
56. "What is an Engineer?" A MRSEC Education Event held at *Brown University* (November 1999).
57. "What is an Engineer?" A MRSEC Institute for local teachers at *Brown University* (March 2000).
58. "Liquid Crystal Materials: Molecules at Work," A MRSEC Institute for local teachers at *Brown University* (March 2000).
59. "Building a Liquid Crystal Display," A MRSEC Institute for local teachers at *Brown University* (March 2000).
60. "Stress and Strain in Polymers," A MRSEC Institute for local teachers at *Brown University* (March 2000).

61. "Liquid Crystal Materials: Molecules at Work," A MRSEC Institute for the Boys and Girls Club of Pawtucket at *Brown University* (April 2000).
62. "Stress, Strain, and Polarized Light," A MRSEC Institute for the Boys and Girls Club of Pawtucket at *Brown University* (April 2000).
63. "Building a Metal Detector Circuit," A MRSEC Institute for The Providence Bridge School (students expelled from Providence City Schools) of Pawtucket at *Brown University* (April 2000).
64. "Liquid Crystal Displays, Color, and all of that," A MRSEC Education Event for the *French American School (FAS)* of Providence, RI (November 2000).
65. "Liquid Crystal Displays, Color and Polarized Light," A MRSEC Educational Event for the *Rhode Island Training School* incarcerated juveniles (November 2000).
66. "Liquid Crystal Displays, Color and Polarized Light," A MRSEC educational event for the *Bridge School of Rhode Island* students expelled from Providence City schools (December 2000).
67. "Stress, Strain, and the Mechanics of Silly Putty," A MRSEC Educational Event for the *Rhode Island Training School*, incarcerated juveniles (December 2000).
68. "What is an Engineer?" A MRSEC Institute for local teachers at *Brown University* (March 2001).
69. "Liquid Crystal Materials: Molecules at Work," A MRSEC Institute for local teachers at *Brown University* (March 2001).
70. "Starting a Business in a Technical World," *Rhode Island Training School*, incarcerated juveniles (April 2001).
71. "Marketing in your Technical Business," *Rhode Island Training School*, incarcerated juveniles (May 2001).
72. "Creating a Business Plan and Company Structure," *Rhode Island Training School*, incarcerated juveniles (May 2001).
73. "Liquid Crystal Displays," MRSEC Urban Scholars Training (MUST) Institute, *Brown University* (July 2001).
74. "Liquid Crystal Displays," A Lecture to NSF REU MRSEC undergraduates, *Brown University* (July 2001).
75. "Building a Switchable Pixel," A hands on laboratory to *NSF REU MRSEC* undergraduates, *Brown University* (July 2001).
76. "MRSEC Urban Scholars Training (MUST) Institute," *Brown University* (July 2001), Co-Organizing with Ms. Jose Vedrine.
77. "Engineering Entrepreneurship," Barus and Holley Addition Dedication, *Brown University* (March 2002).
78. "Liquid Crystal Displays: A Twisted State of Matter," Empowering your Future Workshop for Middle School Girls, co-organizer, *Brown University* (April 2002).
79. "Structures and Earthquakes," Empowering your Future Workshop for Middle School Teachers, co-organizer, *Brown University* (April 2002).
80. "Liquid Crystal Displays: A Twisted State of Matter," Empowering your Future Workshop for Middle School Girls, co-organizer, *Brown University* (April 2003).

81. “Liquid Crystal Displays: A Twisted State of Matter,” MRSEC Materials Institute, *Brown University* (April 2003).
82. “The Egg Drop Competition,” Empowering your Future Workshop for Middle School Teachers, co-organizer, *Brown University* (April 2003).
83. “Liquid Crystals for Displays and Fluorescing Polymers for Security Applications,” Materials Research Society (MRS) Annual Meeting, Boston Science Museum (November 2004).
84. “Fun with Optics,” *Nyatt School*, Barrington, RI (February 2005).
85. “Liquid Crystal Displays,” *MRSEC Institute for Teachers*, Providence, RI (May 2005).
86. “Moving Science,” *Nyatt School*, Barrington, RI (February 2006).
87. “Engineers Engaging the Medical Research Enterprise,” Staff Day, Division of Engineering, *Brown University* (August 2006).
88. “Shaping Your Future: the 21st Century Engineering Changing Responsibility in a Changing World,” Undergraduate Engineering Event, *Brown University* (September 2006).
89. “Thinking Big to the Unimaginably Small: Innovations in Brown Engineering,” Parents Weekend, *Brown University* (October 2006).
90. “Liquid Crystal Displays – that twisted state of matter,” Empowering Your Future, *Brown University* (November 2006).
91. “Research Ethics and Responsible Conduct of Research,” *University of Notre Dame*, Notre Dame, IN (September 2009).

3.6. Workshop Organizer

1. “Electrical Engineering Careers in New England,” *Brown University*, Providence, RI (1997).
2. “Logic of Microspace,” for undergraduate and graduate students, *Brown University* (1998).
3. “Empowering Your Future,” A NSF MRSEC Event for middle school girls and parents, *Brown University* (April 2002).
4. “Empowering Your Future,” A NSF MRSEC Event for middle school girls and parents, *Brown University* (April 2003).
5. “Creating Value Out of Basic Research,” A NSF MRSEC Event for graduate students, postdoctoral students, and local community, *Brown University* (June 2003).
6. “Entrepreneurship, Medicine and Light,” SPIE Sponsored Event for the local business community, *Brown University* (April 2005).
7. “Translational Research: Cooperation between Engineering and the Hospitals,” *Rhode Island Hospital*, Providence, RI (November 2005).
8. “Graduate Student Day,” *Brown University* (February 2006).
9. “Translational Research: Cooperation between Engineering and the Hospitals,” *Brown University* (August 2006).
10. “Translational Research: Cooperation between Engineering and the Hospitals,” *Brown University* (September 2006).
11. “Empowering Your Future,” A NSF MRSEC Event for middle school girls and parents, *Brown University* (November 2006).

12. “Turn Your Hobby into a Business,” Staff Development Day, *Brown University* (August 2007).
13. “Empowering Your Future,” A NSF MRSEC Event for middle school girls and parents, *Brown University* (November 2007).

4. TEACHING AND MENTORING

4.1. Undergraduate Instruction

4.1.1. Science and Technology Related

- (EN 3 – 2001, 2005) “Introduction to Engineering,” Brown University
- (EN 51 – 1996, 1997, 1998, 2000) “Electricity and Magnetism” Brown University
- (EN 52 – 1996, 1997) “Electrical and Optical Systems,” Brown University
- (EN 156 –1997) “Applied Electromagnetics” Brown University
- (EN 193 S01 – 2004, 2005) “Biophotonics,” Brown University
- (PH 199, BIO 194 2005, 2006) “Selected Topics in Molecular Biophysics,” Brown University
- (ENG 291 S38 – 2006, 2007) “Breakthrough Technologies” Brown University
- (EN 291 G – 2008) “Topics in Translational Research and Technologies,” Brown University
- (EN 292 S16 – 1997, 1999, 2002, 2006) “Flat Panel Displays and Material,” Brown University
- (PHYS 33411– 2008) “Junior Physics Seminar,” University of Notre Dame

4.1.2. Entrepreneurship and Business Instruction

- (EN 90 – 1999-2001) “Managerial Decision Making,” Brown University
- (EN 193 S07 – 1999, 2000, 2001, 2002, 2004, 2005) “Engineering Entrepreneurship I” Brown University,” Brown University
- (EN 194 S07 – 2000, 2001, 2002, 2004, 2005, 2006) “Engineering Entrepreneurship II,” Brown University
- (EN 292 S26 – 2005, 2006) “Innovation and Entrepreneurship: Creating Value Out of Graduate Research,” Brown University
- (SC 48100-04 – 2009, 2010, 2012) “Scientific Entrepreneurship,” University of Notre Dame
- (ESTM-60102 – 2009, 2010, 2011) “Technical Marketing,” University of Notre Dame.
- (TUE 2003-04) “Engineering Entrepreneurship Masters Class,” Technical University of Eindhoven (Tu/e)

4.1.3. Professionally Oriented

- (EN 193V – 2007) “Engineers of the Future: Architects of Dreams,” Brown University
- (SC 53310 – 2011) “Ethics in Science,” University of Notre Dame
- (SC 53340 – 2011, 2012, 2013, 2014) “Scientific and Medical Leadership,” University of Notre Dame
- (SC 53320 – 2012, 2013, 2014, 2015) “Diversity, Culture, and Religion in Science,” University of Notre Dame

(CSC 33902 – 2013, 2014, 2015) “Science Policy Ethics: Guiding Science through Regulation of Research and Funding,” University of Notre Dame.

4.1.4. Undergraduate Research Experiences

Mentored and advised numerous undergraduates in the research laboratory throughout my career, some research experiences culminating with a referenced publication. Advocate for undergraduate research at both Brown University and the University of Notre Dame.

4.2. M.Sc. Graduate Theses Advised

(Mentored and advised students in Chemical Engineering, Electrical Engineering, Biology and Entrepreneurship (ESTEEM))

Nancy Eidenlaub (Chemical Engineering, 1998) Brown University
Thesis Title: “Novel Supramolecular Structures from Polymer Assemblies”
Current Position: Project Manager, Albany International (Sweden)

Jau-Jeng Lin (Electrical Engineering, 1999) Brown University
Thesis Title: “Spatial Color Synthesis of Electrically Switchable Bragg Gratings”
Current Position: Director, E-DA Semiconductor (Taiwan)

Stacy Chmura (Biology, 2001) Brown University
Thesis Title: “Reactive Mesogens for Controlled Drug Release Applications”
Current Position: Ph.D. Student, Brown University (last known position)

Gregory Berguig (Electrical Engineering, 2003) Brown University
Thesis Title: “Design and Characterization of a Direct Write Thermal Spray”
Current Position: Vice President, PAC Machinery

Santiago Graces (ESTEEM, 2012) University of Notre Dame
Thesis Title: “HEMAMETRIX: A Biomedical Device Using Inexpensive Spectrometrical Technology”
Current Position: Chief Innovation Officer, City of South Bend

Sean McGee (ESTEEM, 2014) University of Notre Dame
Thesis Title: “Aging Bruises and Child Abuse Cases: A New Technology to Protect Children”
Current Position: Chief Innovation Officer, City of South Bend

4.3. Ph.D. Students and Success

(Advised 16 Ph.D. theses in four disciplines: 7 Physics, 6 Electrical Engineering, 2 Biomedical Engineering, and 1 Materials Science and Engineering)

4.3.1. Ph.D. Graduate Theses Advised

Christopher Bowley (Physics, 1999) Brown University
Thesis Title: “Physical Studies of Holographically Formed Polymer Dispersed Liquid Crystals”
Current Position: Principal, Fish & Richardson law firm (previous: Scientist, 3M)

Adam Fontecchio (Physics, 2002) Brown University
Thesis Title: “Multiplexing Studies of Holographically Formed Polymer Dispersed Liquid Crystals: Morphology, Structure and Device Applications”
Current Position: Professor of Electrical and Computer Engineering, Associate Dean, Drexel University

- Pavel Kossyrev** (Physics, 2003) Brown University
 Thesis Title: “Tailored Molecular Order in Reactive Mesogens”
 Current Position: Senior Research Scientist, Cabot Corporation
- Michael Escuti** (Electrical Engineering, 2003) Brown University
 Thesis Title: “Structured Liquid Crystal/Polymer Composites as Photonic Crystal Switches and LCD Innovation”
 Current Position: Professor of Electrical Engineering, North Carolina State University
- Jun Qi** (Physics, 2003) Brown University
 Thesis Title: “Holographically Formed Polymer Dispersed Liquid Crystals: Physics and Applications”
 Current Position: Engineering Manager, Apple
- Jose Vadrine** (Electrical Engineering, 2004) Brown University
 Thesis Title: “Electromechanical Analysis of Transparent Conducting Substrates for Flexible Flat Panel Display Applications”
 Current Position: Professor of Electrical Engineering, University of Puerto Rico
- Haiqing Xianyu** (Physics, 2004) Brown University
 Thesis Title: “Variable Wavelength Selection Devices: Physics and Applications”
 Current Position: Research Scientist, University of Central Florida
- Soney Varghese*** (Chemical Engineering, 2005) Technical University of Eindhoven
 Thesis Title: “Micro-Rubbing for Novel Liquid Crystal Display Configurations”
 Current Position: Assistant Professor, Indian Institute of Technology Calicut
 * *Co-advisor with Professor Dick Broer, while on sabbatical in Eindhoven*
- I. Amimori** (Materials Science and Engineering, 2006) Brown University
 Thesis Title: “Properties of Stretched Polymer Dispersed Liquid Crystal Films”
 Current Position: Project Researcher, University of Tokyo
- Matthew Souza** (Electrical Engineering, 2006) Brown University
 Thesis Title: “Patterned Liquid Crystal Order on the Micro, Meso-, and Nano-Scale”
 Current Position: Project Development Specialist, 3M
- Suraj Gorkhali** (Electrical Engineering, 2007) Brown University
 Thesis Title: “Intensity and Polarization Holography”
 Current Position: Senior Display Engineer, Apple
- Frederick Biga** (Electrical Engineering, 2007) Brown University
 Thesis Title: “Flexible Conductors for Display Applications”
 Current Position: Vice President, Goldman Sachs
- John McMurdy** (Biomedical Engineering, 2007) Brown University
 Thesis Title: “Biomedical Spectroscopy in Clinical Applications and Implications of Liquid Crystal Filter Technologies”
 Current Position: Biotechnology Advisor, USAID
- James Eakin** (Electrical Engineering, 2008) Brown University
 Thesis Title: “Photo-Patterning Studies for Liquid Crystal Alignment”
 Current Position: Staff Engineering, Qualcomm
- Maureen McCamley** (Biomedical Engineering, 2008) Brown University
 Thesis Title: “Development of a Liquid Crystal Biosensor for the Detection of Endotoxin”
 Current Position: Medical School Student, Emory University

Leslie Shelton (Physics, 2009) Brown University

Thesis Title: "Liquid crystal and polymeric coupling and stressed liquid crystal technology for fourier transform spectroscopy"

Current Position: Scientist DEKA Research and Development (previous: Postdoctoral Fellow, Harvard Medical School)

Collin Lines (Physics, 2014) University of Notre Dame

Thesis Title: "Simulations and Experiments of Photon Propagation in Biological Tissue and Liquid Crystal Waveguides"

Current Position: Postdoctoral Fellow, Massachusetts Institute of Technology Lincoln Labs

4.3.2 Ph.D. Student Success

- 1997** Highly Rated SID Paper, presented by G. P. Crawford, reprinted in *Journal of the SID*, Boston, MA, "Lasing Pixel PDLC Light Valves for Projection Applications," *Journal of the Society for Information Display* **5**, 383-387 (1997), N. M. Lawandy, J. A. Firehammer, S. Vartak, and G. P. Crawford.
- 1998** NASA Rhode Island Space Grant, Adam Fontecchio.
- 1998** NASA Graduate Student Researchers Program (GSRP), Adam Fontecchio, "Switchable Tunable Interference Filters for Remote Sensing Applications."
- 1999** Graduate Student Gold Medal Award, Chris Bowley, 1999 MRS Meeting, San Francisco, CA, "Holographically Formed Polymer Dispersed Liquid Crystal Displays."
- 1999** Highly Rated SID Paper, presented by Michael Escuti. Reprinted in *Journal of the SID*, San Jose, CA, "A model of the fast-switching polymer-stabilized in-plane switching configuration," *Journal of the SID* **7**, 285-288 (1999), M. J. Escuti, C.C. Bowley, G. P. Crawford, and S. Žumer.
- 1999** Highly Rated SID Paper, presented by Chris Bowley. Reprinted in *Journal of the SID*, San Jose, CA, "Electro-optic Investigations of H-PDLCs: The Effect of Monomer Functionality on Display Performance," *Journal of the Society for Information Display* **7**, 281-284 (1999), C. C. Bowley, A. K. Fontecchio, H. Yuan, and G. P. Crawford.
- 1999** NASA Graduate Student Researchers Program (GSRP), Michael Escuti, "Investigation of Bulk and Polymer Dispersed Liquid Crystals in Microgravity."
- 1999** NASA Rhode Island Space Grant, Michael Escuti.
- 2000** *Science News* Article, Pavel Kossyrev, our recent *Applied Physics Letters* paper was highlighted in *Science News*, "Yarn Balls: An Electric Field Induced Structural Transition."
- 2000** Poster Award, Adam Fontecchio, International Liquid Crystal Conference, Sendai, Japan, "Multiplexed Formation of Holographically Formed Polymer Dispersed Liquid Crystal Gratings."
- 2000** Best Student Poster Award, Michael Escuti, 2000 Society for Information Display, Long Beach, CA, "A Model of the Fast Switching Polymer IPS Configuration."
- 2000** *National Science Foundation* US-Japan Summer Fellowship Program, Adam Fontecchio, Tokyo, Japan.
- 2001** Graduate Student Silver Medal Award, Michael Escuti, *2001 MRS Meeting*, Boston, MA, "Electrically Switchable Photonic Crystals."

- 2001** NASA GSRP Fellowship, Michael Escuti (second year).
- 2001** NASA GSRP Fellowship, Adam Fontecchio (third year).
- 2002** New Focus Graduate Student Award, Michael Escuti, *Optical Society for America (OSA)*, Anaheim, CA, “Electrically Switchable Photonic Crystals.”
- 2003** Highly Rated SID Paper, presented by G. P. Crawford, reprinted in *Journal of the SID*, Baltimore, MD, “Reliability of Transparent Conducting Substrates for Rollable Displays: A Cyclic Loading Investigation,” *Journal of the Society for Information Display*, S. Gorkahi, D. R. Cairns, and G. P. Crawford.
- 2003** SPIE Educational Scholarship in Optical Science and Engineering, James Eakin, *International Society for Optical Engineering*, San Diego, CA. “Photonic Crystals.”
- 2003** Rhode Island Space Grant Fellowship Award, Matthew Sousa.
- 2004** Glenn H. Brown Award, highest honor bestowed by International Liquid Crystal Society for best Ph.D. thesis, Dr. Michael Escuti, at International Liquid Crystal Conference, Ljubljana, Slovenia, “Structured Liquid Crystal Polymer Composites as Photonic Crystal Switches and LCD Innovations.”
- 2004** International Liquid Crystal Conference (ILCS) Multimedia Prize, Dr. Adam Fontecchio, Ljubljana, Slovenia.
- 2004** SPIE Education Scholarship in Optical Sciences and Engineering, James Eakin, *International Society for Optical Engineering*, San Diego, Optics Education Outreach.
- 2004** SPIE Education Scholarship in Optical Sciences and Engineering, Matthew Sousa, *International Society for Optical Engineering*, San Diego, Networking in Optical Community.
- 2004** NASA GSRP Fellowship, James Eakin.
- 2005** Best Student Paper, *Journal of the Society for Information Display*, Matthew Sousa.
- 2005** NASA GSRP Fellowship, John McMurdy.
- 2005** SPIE Education Scholarship in Optical Sciences and Engineering: John McMurdy and Scott Woltman, *International Society for Optical Engineering*, San Diego
- 2005** NASA GSRP Fellowship, James Eakin, (second year).
- 2005** Rhode Island Space Grant Scholarship, John McMurdy.
- 2005** SPIE Education Scholarship in Optical Sciences and Engineering: Matthew Sousa, *International Society for Optical Engineering*, San Diego, Networking in Optical Community.
- 2006** NASA GSRP Fellowship, Maureen McCamley.
- 2006** SPIE Education Scholarship in Optical Sciences and Engineering: John McMurdy and Scott Woltman, *International Society for Optical Engineering*, San Diego (second year in a row for both).
- 2007** NASA GSRP Fellowships, Maureen McCamley, John McMurdy, and Scott Woltman.
- 2008** NASA GSRP Fellowship, Maureen McCamley (third year).

4.4. Postdoctoral Fellows Supervised

Darran Cairns (1998-2001) Brown University

Project Title: "Supermolecular Assemblies and Flexible Substrate Technology"

Current Position: Associate Professor, West Virginia University

Garfield Warren (2000) Brown University

Project Title: "Liquid Crystal Switchable Waveguide Devices"

Current Position: Research Scientist, Indiana University

Mousimi DeSarkar (2000-2002) Brown University

Project Title: "Chemistry and Phase Separation of Polymer Dispersions"

Current Position: Program Manager, DGM Techno-Commercial Innovations (India)

Yuri Boiko (2000) Brown University

Project Title: "Electrically Switching Beam Steering Devices"

Current Position: Senior Scientist, National Research Council, Canada (last known position)

Karen Vardanyan (2001-2002) Brown University

Project Title: "Electrically Switching Devices and Liquid Crystal Technologies"

Current Position: Assistant Professor, Southern Illinois University, Edwardsville

5. INDUSTRY ENGAGEMENT

(Connected with industry on many fronts to facilitate partnerships and diversity sponsored research strategies, including proposal development for joint research, sponsored research, use of laboratory and core facilities, career services and student recruitment. Sponsored students' projects for entrepreneurship course and interest in my laboratory or in the university more generally. Below is a selected list of companies with more significant interactions. (See section 2.2 for industry research sponsorship details related to my research).

- 1996-97** dpiX – A Xerox Company (sponsored research); Corning Inc. (proposal development); Foster- Miller (proposal development, facilities); Holographic Lithographic Systems (facilities); Optron Systems (sponsored research); Spectra Physics (sponsored research); Etalon (interest), Arconium (research interest).
- 1997-98** Foster-Miller (proposal development); Comtect (research interest); Reveo (sponsored research); Caterpillar (research interest); Kodak (research interest); AeroAstro (proposal development, student projects).
- 1998-99** Kodak (proposal preparation); Foster-Miller (joint research); AeroAstro (proposal development); Reveo (sponsored research); Nippon (research interest); 3M (proposal development); Radiant Images, Inc. (sponsored research); Printed Transistor (research interest).
- 1999-00** Philips (3-month summer in Netherlands); Foster Miller (sponsored research); Printed Transistor (research interest); 3M (sponsored research); Albany (sponsored course project); Comtech (sponsored course project); Resonant Cavity (research interest); Philips (research collaboration); NTT (research interest); Raytheon (proposal development); Optron (sponsored research); Visson Display Technology (research interest).

- 2000-01** Opto-Knowledge (sponsored research); Scientific Solutions (sponsored research); Xerox (training); Fugi Film (sponsored research); Philips (research interest and collaboration); Visson (research interest); SRU Biosystems (research interest); Microcontinuum (research interest); Agis Semiconductor (research interest); Raytheon (sponsored research); Laser Fare (sponsored course project); Reveo (sponsored research); Foster-Miller (sponsored research); Newton Photonics (research interest).
- 2001-02** Philips (research collaboration); TelAztec (research interest); Foster-Miller (sponsored research); Fugi Film (sponsored research); MicroDisplay (research interest); Raytheon (sponsored research); Scientific Solutions (proposal development and sponsored research); International Manufacturing (sponsored course project); Laser Fare (sponsored course project); Afferent (sponsored course project); 3M-Microtouch (sponsored research); Cabot Corporation (research interest, proposal development); Radiant Images (sponsored research); Lockheed Martin (proposal development); Optiva (sponsored research).
- 2002-03** Cell Based Delivery (sponsored course project); Opton (sponsored research); 3M-Microtouch (sponsored research); Scientific Solution (sponsored research); Optiva (sponsored research); Triton (sponsored course project); Eikos (research interest); Optoknowledge (sponsored research).
- 2003-04** *On Sabbatical Leave in The Netherlands* – Eikos (research collaboration); Scientific Solutions (sponsored research); Philips (joint projects while on sabbatical).
- 2004-05** Philips (research interest and collaboration); DSM (research interest); Eikos (research interest); Scientific Solutions (sponsored research); Triton (proposal development); AeroAstro (sponsored student project); Reveo (sponsored research).
- 2005-06** Philips (research interest and collaboration); Scientific Solutions (sponsored research); Reveo (sponsored research, student recruiting); Cabot Corporation (research interest, student recruitment); Amgen Corporation (research interest, student recruitment); General Electric (research interest).
- 2006-07** Rite Solutions (proposal development); Raytheon (research interest); Cabot Corporation (research interest); Scientific Solutions (sponsored research); Amgen Corporation (research interest, student recruitment).
- 2007-08** General Electric (research interest); Rite Solutions (proposal development); Scientific Solutions (sponsored research); Reveo (research interest); Philips (research interest and collaboration); Dassault Systems (research interest); General Motors (research interest).
- 2008-09** Conexus (research interest); Roach (research interest); 3M (research interest); Xerox (research interest); Cook Biotech (research interest); Eli Lilly (research interest, student recruitment); Siemens (national science competition); Rite Solutions (course development cooperation).
- 2009-10** 3M (research interest); Xerox (research interest); Cook Biotech (research interest); Eli Lilly (research interest, student recruitment); Rite Solutions (course development cooperation).

- 2010-11** VWR (supplier relationship); 3M (research interest); Johnson & Johnson (research interest in life sciences); Whirlpool (student intern competition); Astellis (research interest); Biomarin (research interest); Merck (research interest); Pfizer (research interest); Cook Biotech (research interest); Siemens (national science competition); Eli Lilly (research interest); Rite Solutions (student class collaboration).
- 2011-12** VWR (supplier relationship); Eli Lilly (research interest); Spectron (research interest); Best Medical (research collaboration); Caresteam (research interests).
- 2012-2013** Abbot Corporation (sponsored research); Quest (research interest); Carestream (sponsored research); Spectron (research interest); Best Medical (research interest); Quest Medical (research interest); Merck (research interest); General Electric (research interest); Eli Lilly (research interest).
- 2013-14** Glynn Capital (strategic planning California); PivotNorth Ventures (strategic planning California); Qualcomm (research interest); Eli Lilly (research interest); Stryker (student recruitment); IBM (research interest); Apple (student recruitment); Tire Rack (through Asante Foundation); SynGlyphX (research interest); SRAM (ride support).

The Notre Dame California Initiative launched in 2014 has resulted in significant company/firm/organization engagement in California on all levels, including research, student recruitment, student tours and visits, and student engagement.

- 2014-15** Walmart Research (student recruitment); Salesforce (student recruitment); SRI (research/commercialization interest); Stryker (research interest, student interest); Google Ventures (investment in start-ups); Accel Venture (investment in start-ups, student recruitment); Apple (student recruitment); Facebook (student recruitment); eBay (student recruitment); Google (student recruitment and research); Yelp (student recruitment); AT&T (student recruitment); NetSuite (student recruitment); MobileIron (student recruitment), Goldman Sachs (student recruitment); Zeltiq (student recruitment, research interest, student engagement); 23 & Me (student engagement and recruitment); IDEO (research interest, student recruitment, student engagement); Silicon Valley Bank (student recruitment); SAP (research interest, student recruitment); ClosetClicks (student recruitment); DirecTV (student recruitment); Mercatus (student recruitment, student engagement); Mounza (student recruitment); Visa (student recruitment); Stellar Solutions (research interest, student recruitment); PG&E (student recruitment); Marketo (student recruitment, student engagement); Radar Ventures (investment); Pixar (student recruitment); Twitter (student recruitment); Cisco (student recruitment); Cludera (student recruitment); Cube You (student recruitment); Price Waterhouse and Coopers (student recruitment); IBM (student recruitment, research); Intuit (student recruitment); NeoPhotonics (student recruitment); LinkedIn (student recruitment); Merrill Lynch (student recruitment); Ernst & Young (student recruitment); Yahoo (student recruitment); Tesla (student recruitment); Prudential (student recruitment); Western Digital (student recruitment); 20th Century Fox (student recruitment); Deloitte (student recruitment); Glynn Capital (strategic planning California); PivotNorth Ventures (strategic planning California); SRAM (ride support); Greenberg Traurig, LLP (student engagement and recruitment); Orrick (student engagement and recruitment); Fenwick and West, LLP (student engagement and recruitment); Morrison Foerster, LLP (student engagement and recruitment); Cooley, LLP (student engagement and recruitment); Schwegman,

Lundberg and Woessner, LLP (student engagement and recruitment); Forward Accelerator (student engagement); Jive Software (student engagement and recruitment); OralEye (student engagement and recruitment); Intuitive Surgical (student engagement and recruitment); Calithera (student engagement and recruitment); Plug and Play Tech Center (student engagement and recruitment); Lemnos Labs (student engagement); MycoWorks (student engagement and recruitment); Qualcomm (student engagement and recruitment); Cisco (student engagement and recruitment); Dropbox (student engagement and recruitment); Palinter (student engagement and recruitment); KPMG (student engagement and recruitment); Intel (student engagement and recruitment); PG&E (student engagement and recruitment); Frist Republic (student engagement and recruitment); Visa (student engagement and recruitment); GE Ventures (student engagement and recruitment); Snapchat (student recruitment); Hewlett Packard (student recruitment and research); Lockheed Martin (student recruitment and research); WhoKnows (alumni interaction platform); Northrup Grumman (student recruitment and research); Oracle (student recruitment); Survata (student recruitment); Boost Media (student recruitment); Chevron (student recruitment); Grand Rounds Health (student recruitment); Recurrent Energy (student recruitment); AT&T (space, research, and student recruitment); NASDAQ (student recruitment).

6. MEDIA AND PRESS

6.1. Media on Research and Pedagogy

1. "State Gives \$1.25 Million to Encourage Job Creation," William J. Donovan, *Providence Journal*, Dec. 9, 1997. (Article on the Slater Grant my laboratory received.)
2. "Promise of Collaboration Lured Engineer from Xerox," Scott J. Turner, *George Street Journal* 1998. (Article on my research at Brown.)
3. "Teens Learn About Living in a Materials World Thanks to Engineering Project," Scott J. Turner, *George Street Journal*, 1999. (Article on my outreach work with the Boys and Girls Club).
4. "Crawford Receives Assistant Professor Chair at Brown," *ALCOM Update* 9, July 1999. (Article on the Richard and Edna Salomon Assistant Professor Chair.)
5. "Students Engineering Start-Ups Pursue Products with Local Companies," Scott J. Turner, *George Street Journal*, 1999. (Article on entrepreneurship course.)
6. "Anyone Want to Knit a Microscopic Sweater," P. Weiss, *Science News* 158, 2000, 374. (Article on one of our Applied Physics Letters papers that reported on a unique configuration we called the yarn ball.)
7. "Nano-Knitting," Lori Baker, *Brown Alumni Monthly*, March/April 2001. (Article on our recent discovery of nano-yarn balls.)
8. "Brown's students – business link surpasses internships," Michael Pare, *Providence Business News*, April 30-May 6, 2001, Focus Section. (Article on my entrepreneurship course.)
9. "Professor Teaches Engineering, Business to Imprisoned Teens," Janet Kerlin, *George Street Journal*, June 22-July 5, 2001. Article on my outreach efforts to incarcerated teens.
10. "Engineers in Training," *George Street Journal*, Aug. 3-30, 2001, 3. (Article on MRSEC Urban Scholars Program that I organized).

11. Brown Researchers Ready to Explore Uses for Display Technology Donated by GM, Delphi,” Kate Bramson, *George Street Journal*, 2002. (Article on patent donation to Brown for my laboratory.)
12. “Course will end, but not the work of engineering students who created portable printer in partnership with R.I. business,” Kate Bramson, *George Street Journal*, April 12-18, 2002. (Article on one of my entrepreneurship groups, Piggyback.)
13. “Ferrosity Gets Off to Roaring Start with 25K,” Adria Cimino, *Mass High Tech*, May 27–June 2, 2002. (Article on one of my entrepreneurship teams, Ferrosity.)
14. “Going for a Spin: Local Companies Share Their Technology with Budding Entrepreneurs at Brown,” Andrea Stape, *Providence Journal*, Sept. 26, 2002, Business Section. (Article on my entrepreneurship course.)
15. “Brown Students Engineer Tech Start-Up Companies,” David Ortiz, *Providence Business News* **18**, 2003. (Article on our student entrepreneurship teams.)
16. “Brown Forms Partnership in Second Bid for Science Grant,” Patricia Resenda, *Providence Business News* **16**, 2003. (Article on our Partnership for Innovation Proposal submitted to the National Science Foundation.)
17. “The Incredible Shrinking Transformer,” Kristen Cole, *George Street Journal*, Mar. 14 2003, 1. (Article on one of my entrepreneurship groups, Conformance Solutions.)
18. “In the Beginning...Creating Companies is Goal of Cooperative Proposal,” Andrea Stape, *Providence Journal*, Mar. 22, 2003, Business Section. (Article on our Partnership for Innovation Proposal.)
19. “Undergraduate course in Entrepreneurship,” Hans Buskes, *Inside The DPI, the Magazine for the Polymer Community* **2**, 2003, 10-12. (Article highlighting our entrepreneurship.)
20. IDMC Meets Taipei: Love at First Sight,” Ken Werner, *Information Display* **19**, 2003, 36.
21. “Holographic Control,” Graham P. Collins, *Scientific American*, **22**, July 2003. (Article on photonic crystal work).
22. [In Dutch] “Ondernemen Niet Meer Voor Losers,” *Cursor* **46**, 2004, 9. (Article highlighting the student business plan competition at the TU/e, in which I was a judge.)
23. [In Dutch] “Hoger Onderwijsprijs New Venture Naar Tu/e Alumnus,” *Cursor* **46**, 2004, 4. (Article highlighting the student business plan competition in the Netherlands in which my students participated.)
24. “Are Nanomaterials Safe?” Wendy Lawton, *Inside Brown*, Nov. 15, 2005.
25. “Brown University Researchers Hope to Shine Light on Anemia with Startup,” Dyke Henderson, *Mass High Tech*, Dec. 18-25, 2005.
26. “Student Entrepreneurship: Greg Crawford shares his thoughts on Entrepreneurship for Students,” *SPIE Professional*, January 2006.
27. “Research Weds Engineering, Medicine,” Raquel Harper, *Providence Business News*, Mar. 5, 2006.
28. “Spectroscopy Detects Anemia,” Marion Davis, *Biophotonics International*, Mar. 21, 2006.
29. “Doctors and Engineers Pool Their Knowledge to Advance Medicine,” Wendy Lawton, *Inside Brown*, Feb. 15, 2006.

30. "AnemiCAM Focuses on Developing World: Brown University E-Team Develops Low Cost, Non-Invasive Anemia Diagnostic," *NCIIA News*, Fall 2006.
31. "Learning to Love a Challenge," Marty Downs, *Inside Brown*, Nov. 28, 2006.
32. "Gregory Crawford, dean, College of Science, University of Notre Dame," Virginia Gewin, *Nature* **452**, April 16, 2008.
33. "Notre Dame Unveils New Science, Engineering, Business Program," *Inside Indiana Business*, August 2009.
34. "Notre Dame Researcher Publish New Findings on Aging Pediatric Bruises," *e Science News*, Jan. 26, 2012.
35. "New Findings on Aging Pediatric Bruises," ScienceDaily, Jan. 26, 2012.
36. "Entering the Pink Zone," Kirby Sprouls, *South Bend Tribune*, Jan. 29, 2012.
37. "Diversity a Big Deal," Gene Stowe, *South Bend Tribune*, Nov. 11, 2012. (Article on new diversity class.)
38. "N.D. Program Urges Students to Explore Culture," Associated Press, *ABC7 Eyewitness News*, Aug. 29, 2010.
39. "See the Future: Notre Dame Science Dean Greg Crawford Promotes Groundbreaking Diversity Initiatives," Gene Stowe, *Racing Toward Diversity*, Winter 2013. (Article on new diversity class.)
40. "Notre Dame Women Join Spin-a-thon," May Lee Johnson, *South Bend Tribune*, January 27, 2013, (Article on 24-hour spin-a-thon partnership between College of Science, Knollwood Country Club and Notre Dame Women's Basketball team.)
41. "ND science dean to become associate provost, VP," *South Bend Tribune*, Sept. 2, 2014.
42. "Gregory Crawford, Dean at Notre Dame, Selected as BIO 2015 Everyday Superhero Finalist," Biotechnology Industry Organization, *Yahoo Finance*, April 20, 2015.
43. "Gregory Crawford, Dean at Notre Dame, Selected as BIO 2015 Everyday Superhero Finalist," Biotechnology Industry Organization, *Business Wire*, April 20, 2015.
44. "Gregory Crawford, Dean at Notre Dame Selected as BIO 2015 Everyday Superhero Finalist," Press Release, *Reuters*, April 20, 2015.
45. "The University of Notre Dame's Gregory P. Crawford, Dean of the College of Science, to receive Guardian Angel Award at DART's Gladys Knight Gala," Dana's Angels Research Trust, *Dana's Angels Research Trust*, April 25, 2015.
46. "BIO Deems Gregory Crawford 2015 Everyday Superhero Finalist," Biotechnology Industry Organization, *Thomas Publishing Company*, April 27, 2015.

6.2. Media on Cross Country Bicycle Rides

(Bicycled over 14,700 miles in five years across the country and raised money and awareness for the rare disease Niemann-Pick Type C.)

1. "Notre Dame dean to ride bike 2,200 miles," Associated Press, *Chicago Tribune*, July 12, 2010.
2. "Notre Dame dean to ride bike 2,200 miles," Associated Press, *Indianapolis Star*, July 12, 2010.
3. Interview, Morning News, *FOX 59, WXIN-TV*, Indianapolis, July 12, 2010.

4. "Notre Dame dean biking 2,200 miles to celebrate medical partnership," *South Bend Tribune*, South Bend, IN, July 12, 2010.
5. "Notre Dame dean to ride bike 2,200 miles," Associated Press, *WSBT-TV*, South Bend, July 12, 2010.
6. Interview with Greg Crawford JT in the Morning, *WSBT-AM*, South Bend, July 14, 2010.
7. "Notre Dame dean and wife bike 2,000 miles to save kids' lives," *WNDU-TV*, South Bend, July 14, 2010.
8. Interview with Greg Crawford, Jack, Shelli & Bruce Show, *Sunny 101.5*, South Bend, July 15, 2010.
9. "Notre Dame dean, wife are biking for cause," Margaret Fosmoe, *South Bend Tribune*, July 19, 2010.
10. Interview with Greg Crawford, "Jack, Shelli & Bruce Show," *Sunny 101.5*, South Bend, July 23, 2010.
11. "Desert to Dome," *KOLD-TV*, Tucson, AZ, July 24, 2010.
12. "Road Warrior," *KMSB-TV*, Tucson, AZ, July 24, 2010.
13. "Desert to Dome," Radio interview with Greg Crawford, "High Plains Update," *KENW/KMTH/KENM-FM*, Portales, NM, July 28, 2010.
14. Radio interview with Greg Crawford, JT in the Morning, *WSBT-AM*, South Bend, July 29, 2010.
15. "ND dean and wife on mile 300 of 2,000 mile bike ride," *WNDU*, South Bend, July 29, 2010.
16. Radio interview with Greg Crawford, "Jack, Shelli & Bruce Show", *Sunny 101.5*, South Bend, July 30, 2010.
17. "Desert to Dome riders reach Texas," *South Bend Tribune*, Aug. 3, 2010.
18. "Couple on bike trek to find Niemann-Pick cure," Ricky Maranon, *Tulsa World*, Tulsa, OK, Aug. 10, 2010.
19. "Notre Dame dean, wife stop in Columbia on awareness tour," *Missourian*, Columbia, MO, Aug. 14, 2010.
20. "Dean, wife bike from Ariz. to ND for cause," *The Observer*, Notre Dame, IN, Aug. 20, 2010.
21. "Notre Dame dean, wife end cross-country bike ride," Associated Press, *KSWT-TV*, Yuma, AZ, Aug. 23, 2010.
22. "Notre Dame dean, wife end cross-country bike ride," Associated Press, Eyewitness News, *WTHR-TV*, Indianapolis, Aug. 23, 2010.
23. "ND Dean and wife bike 2,000+ miles to Dome, raising awareness for rare disease," Alana Greenfogel, *WNDU*, South Bend, Aug. 23, 2010.
24. "Couple rides from Desert to Dome for medical research," Michelle Anthony, *WNDU*, South Bend, Aug. 23, 2010.
25. "ND dean, wife complete 2,300-mile ride for medical research," *WSBT and South Bend Tribune Web sites*, Aug. 23, 2010.
26. "Desert to Dome ride concludes at Notre Dame," Dave Schroeder, *Fox 28, WSJV*, Elkhart, IN, Aug. 23, 2010.

27. "Notre Dame dean, wife finish 2,300-mile charity bike ride from Tucson to South Bend," Associated Press, *The Republic*, Columbus, IN, Aug. 23, 2010.
28. "Dean Bikes to Raise Money for Medical Research," Associated Press, *Water cooler, WJZ-TV*, Baltimore, MD, Aug. 24, 2010.
29. "Dean's long ride," Bizarre News, *ABC12.com*, Flint, MI, Aug. 24, 2010.
30. "Desert to Dome for a cure," Margaret Fosmoe, *South Bend Tribune*, Aug. 24, 2010.
31. "Crawfords reflect on Desert to Dome journey," *The Observer*, Notre Dame, Sept. 10, 2010.
32. "Notre Dame dean, wife plan second cross-country bike ride," *South Bend Tribune*, June 6, 2011.
33. "Ara's Fight," *WNDU-TV*, South Bend, June 9, 2011.
34. "Road to Discovery: Notre Dame professor bikes 2,200 miles for research," Maureen McFadden, *WNDU*, South Bend, June 9, 2011.
35. "Morning Show-NPC Conference," *Fox 28, WSJV*, Elkhart, June 10, 2011.
36. "Road to Discovery begins," *WNDU*, South Bend, June 13, 2011.
37. "Notre Dame dean, wife on day three of bike ride," *South Bend Tribune*, June 15, 2011.
38. "UPDATE: Notre Dame dean continues Road to Discovery," *WNDU*, South Bend, June 17, 2011.
39. "Boston med student lost 3 siblings to same rare disease," *WCVB-TV5*, Boston, June 22, 2011.
40. "Notre Dame dean finishes cross-country bike ride," *Fox 28*, Elkhart, July 8, 2011.
41. "Notre Dame couple completes 26-day charity bike ride to Dallas," *WNDU*, South Bend, July 8, 2011.
42. "Notre Dame professor and wife return to Michiana after bike ride," *WNDU*, South Bend, July 10, 2011.
43. "Science dean and wife bike for disease research," *The Observer*, Notre Dame, Aug. 19, 2011.
44. "Greg Crawford rides again for Parseghian Foundation," *South Bend Tribune*, May 20, 2012.
45. "Biker raising awareness of deadly disease that strikes children," *Corning (NY) Leader*, May 24, 2012.
46. "Good morning, Buffalo: Back on his bike for a third year," *Buffalo (NY) News*, May 25, 2012.
47. "Trip raises awareness of rare disease," *WIVB 4*, Buffalo, NY, May 25, 2012.
48. "Man cycling across country to fight rare disease," *WTVG 13ABC*, Toledo, OH, May 28, 2012.
49. "Notre Dame dean cycles through South Bend on his way across the country," *WNDU*, South Bend, May 29, 2012.
50. The Jack, Bruce, and Abby show interviewed Greg Crawford before leaving South Bend, *Sunny 101.5*, South Bend, and May 31, 2012.

51. "Notre Dame Science Dean biking coast-to-coast to fight rare disease," *Inside Indiana Business*, May 31, 2012.
52. "Notre Dame Alumni Welcome Dean Greg Crawford to Iowa City," *Eastern Iowa Health*, May 31, 2012.
53. "Biking for Niemann-Pick Type C," *Hudson (N.Y.) Register Star*, May 31, 2012.
54. "Notre Dame dean on ride to fight childhood disease," *Quad City Times*, Davenport, IA, June 1, 2012.
55. "Dean rides to save lives," *The Poughkeepsie (N.Y.) Journal*, June 3, 2012.
56. "Notre Dame dean pedals into Omaha for a cause," *1110 KFAB, Omaha*, June 5, 2012.
57. "A tour for the cure," *Mendota (IL) Reporter*, June 5, 2012.
58. "Notre Dame dean bikes for rare disease," *The Grand Island (NE) Independent*, June 6, 2012.
59. "One man pedals to raise awareness for childhood disease," *KLKN ABC 8*, Lincoln, NE, June 6, 2012.
60. "Road to Discovery continues into Nebraska," *WNDU*, South Bend, June 6, 2012;
61. "Cross-country rider," *McCook (Neb.) Daily Gazette*, June 8, 2012.
62. "Cross country bike rider to travel through Craig tomorrow," *KRAI*, Craig, CO, June 11, 2012.
63. "Notre Dame dean passes through Craig on cross-country trek," *Craig (CO) Daily Press*, June 14, 2012.
64. "Notre Dame dean rides for cure," *Yuma (CO) Pioneer*, June 14, 2012.
65. "Cross-country cyclists stop in Rio Blanco County," *Rio Blanco Herald Times*, Meeker, CO, June 18, 2012.
66. "Physicist rides bike to raise money for rare disease," *Utah Basin Standard*, Roosevelt, UT, June 19, 2012.
67. "Hempel twins meet bicyclist riding for Niemann-Pick Type C disease," *Reno (NV) Gazette*, June 19, 2012.
68. "Hempel twins fight for life, Notre Dame dean rides across country to raise awareness," *KRNV 4*, Reno, NV, June 20, 2012.
69. "College dean cycles for children's cure," *KOLO 8*, Reno, June 20, 2012.
70. "College dean rides to bring awareness to rare childhood disease," *KOVR CBS13*, Sacramento, CA, June 20, 2012.
71. "Notre Dame professor bikes for awareness," *KTXL FOX 40*, Sacramento, CA, June 21, 2012.
72. "Knowing that you're not alone," *Reno (Nev.) Gazette*, June 23, 2012;
73. "Notre Dame dean finishes third Road to Discovery," *WNDU*, South Bend, June 26, 2012.
74. "Greg Crawford, the Bikin' Irish, to visit Ventura!" *Ventura (CA) Breeze*, May 31, 2013.
75. "Dean to bike more than 3,000 miles in fourth annual Road to Discovery," University of Notre Dame press release, Notre Dame, IN, June 18, 2013.

76. "ND science dean cycling to fight disease," Notre Dame Alumni Association, University of Notre Dame, Notre Dame, IN, June 18, 2013.
77. "ND dean of science to begin annual bike trek," *WNDU*, South Bend, June 19, 2013.
78. "Road to Discovery bike ride for rare disease research to stop in Westchester," *The Argonaut*, Los Angeles, June 20, 2013.
79. "Crossing The Country for a Cure," *Blue & Gold Illustrated*, South Bend, June 27, 2013.
80. "Notre Dame dean stops in Ventura before cross-country awareness campaign," *Ventura County (CA) Star*, June 27, 2013.
81. "Notre Dame dean biking across the country for fundraiser," *WNDU*, South Bend, June 28, 2013.
82. "Niemann-Pick cure goal of bike ride," *Arizona Daily Star*, Tucson, AZ, July 1, 2013.
83. "UPDATE: Notre Dame dean in ninth day of 'Road to Discovery,'" *WNDU*, South Bend, July 5, 2013.
84. "Road to Discovery," *WNIT Public Television*, South Bend, July 8, 2013.
85. "Road to Discovery and Notre Dame FCU Journey to Frisco, Texas, to Help Raise Awareness and Funds for Niemann-Pick Type C (NPC) Disease," *PRweb.com*, July 8, 2013.
86. "Road to Discovery and Notre Dame FCU Journey to Frisco, Texas to Help Raise Awareness and Funds for Niemann-Pick Type C (NPC) Disease," *KPLC*, Lake Charles, LA, July 8, 2013.
87. "Notre Dame dean rides for disease awareness," *White Mountain Independent*, Show Low, AZ, July 9, 2013.
88. "Notre Dame dean bikes across country, stops in Midland," *Midland (TX) Reporter-Telegram*, July 10, 2013.
89. "Morning News Brief for July 10, 2013," *KLST*, San Angelo, TX, July 10, 2013.
90. "Cycling across the country for a cure," *KNEL*, Brady, TX, July 11, 2013.
91. "Notre Dame dean on 'Road to Discovery,'" *The Banner-Press*, Brenham, Washington County, TX, July 15, 2013.
92. *The American Press*, Lake Charles, LA, July 16, 2013.
93. "Notre Dame dean bikes through Opelousas to raise awareness for rare disease," *The Daily World*, Sulphur, LA, July 16, 2013.
94. "A college dean is riding his bike across the country to help find a cure; 2013 Road to Discovery," *NBC33*, Baton Rouge, LA, July 17, 2013.
95. "A college dean is riding his bike across the country to help find a cure; 2013 Road to Discovery," *WGMB* and *WVLA*, Baton Rouge, LA, July 17, 2013.
96. "Notre Dame dean bikes 2,000 miles, raises awareness for Niemann-Pick disease," *The Mississippi Press*, July 19, 2013.
97. "Man cycling cross country for rare disease, makes stop in South Mississippi," *WLOX*, Biloxi, MS, July 19, 2013.
98. "Notre Dame professor pedals through South Mississippi for a cause," *WLOX*, Biloxi, MS, July 20, 2013.

99. "Professor treks cross country to raise money for research," *WPMI*, Mobile, AL, July 20, 2013.
100. "Notre Dame dean cycling across the country to raise awareness for disease research," *Yahoo! Sports*, July 22, 2013.
101. "Notre Dame cyclist rides through Auburn raising money for a cure," *Opelika-Auburn News*, Opelika, AL, July 22, 2013.
102. "UND dean on quest for a cure," *Greenville (AL) Advocate*, July 23, 2013.
103. "Cross-country ride highlights rare disease," *Newman (GA) Times-Herald*, July 23, 2013.
104. *WSNT, WACO*, Sandersville, GA, July 24, 2013.
105. "Notre Dame alumni raise awareness of rare disease," *Moultrie News*, Charleston, SC, July 26, 2013.
106. "A cross-country biker made a stop in the Lowcountry," *WCBD*, Charleston, SC, July 27, 2013.
107. "A cross-country biker made a stop in the Lowcountry," *NBC News.com*, July 27, 2013.
108. "College dean makes stop in Myrtle Beach on his bike ride across the nation," *WPDE*, Myrtle Beach, SC, July 28, 2013.
109. "Notre Dame science dean hoping to win one for Coach," *Post and Courier*, Charleston, SC, July 29, 2013.
110. *Sandersville (GA) Progress*, July 30, 2013.
111. "Notre Dame professor rides into Dunn for a cause," *The Daily Record*, Dunn, NC, July 30, 2013.
112. "Biker rides to raise awareness," *Jasper County Sun*, Ridgeland, SC, July 31, 2013.
113. "Join Notre Dame alumni and friends at Kelly's Irish Times to meet Greg Crawford and learn about the Road to Discovery story," *PRweb.com*, July 31, 2013.
114. "Bike ride wrap-up," *WSBT Radio*, South Bend, Aug. 5, 2013.
115. "Notre Dame dean rides across the country for the fourth time," *WNDU*, South Bend, Aug. 5, 2013.
116. "Notre Dame dean bikes for a cure," *Comcast Sports Network*, Baltimore, MD, Aug. 6, 2013.
117. "Greg Crawford on "Experience Michiana," *WNIT Public Television*, South Bend, Aug. 8, 2013.
118. "Dean Crawford bikes to raise awareness for NPC," *The Observer*, Notre Dame, Aug. 30, 2013.
119. "Dedicated Irish fans bike 100 miles for season opener," *WNDU*, South Bend, Aug.31, 2103.
120. "Astonishing Acts by Everyday People," *Daily Worth*, Dec. 21, 2013.
121. "Gladys Knight to headline Dana's Angels gala and benefit concert," *Greenwich Times*, Greenwich, CT, April 20, 2015.
122. "How one everyday superhero combats rare disease," *Global Genes RARECast* Podcast with Daniel Levin, May 1, 2015.

123. "Q-C family hopes to raise money for rare disease research," *Moline Dispatch/QConline.com*, Davenport, IA, May 7, 2015.
124. "May 30 Dana's Angels concert to feature Gladys Knight," *Greenwich Times*, Greenwich, May 9, 2015.
125. "ND faculty member begins "Road to Discovery" cross-country bike ride," *WNDU*, South Bend, May 27, 2015.
126. "Loss inspires U. of Notre Dame dean to bike across U.S.," *Times of Trenton/NJ.com*, Trenton, N.J., May 28, 2015.
127. Interview with "JT in the Morning," *WSBT* radio, South Bend, May 28, 2015.
128. Notre Dame FCU sponsors 3,500-mile bike ride supporting Ara Parseghian Medical Research Foundation," *Credit Union Insight*, May 29, 2015.
129. Video: "Cyclist biking cross-country for a good cause," *ABC 6*, Philadelphia, PA, May 29, 2015.
130. *WCAU, NBC*, Philadelphia, PA, May 29, 2015.
131. "Notre Dame dean bikes to battle fatal disease," *Philadelphia (PA) Inquirer*, May 30, 2015.
132. "Bicyclist stops in Harrisburg on 3,500 mile journey," *WPMT FOX*, Harrisburg, PA, May 31, 2015.
133. "Man biking across the country to raise awareness for rare disease," *CBS 21*, Harrisburg, PA, May 31, 2015.
134. "Reception Thursday for dean on cross-country bike ride," *South Bend Tribune*, June 2, 2015.
135. Interview with "JT in the Morning" (opens an audio file), *WSBT* radio, South Bend, June 3, 2015.
136. "Notre Dame dean biking 'Road to Discovery' for rare disease," *FOX 28*, Elkhart, June 4, 2015.
137. "Man biking across country raising awareness of rare childhood disease," *ABC 13*, Toledo, OH, June 4, 2015.
138. "Road to Discovery: one professor bikes across the country to raise money for disease research," *WNDU*, South Bend, June 5, 2015.
139. "Greenwich-based non-profit raises \$300,000 for medical research," *Greenwich (CT) Post*, Greenwich, June 6, 2015.
140. "The Dish: Gladys Knight thrills at DART benefit," *Greenwich (CT) Times*, Greenwich, June 6, 2015.
141. "Notre Dame professor biking across the country to raise money for rare disease research," *WBBM CBS*, Chicago, June 6, 2015.
142. "Bicyclist stops in Davenport during 3,500 mile ride for rare disease research," *WQAD ABC 8*, Davenport, IA, June 7, 2015.
143. "Man bikes across U.S., stops in Quad Cities," *WHBF CBS*, Davenport, IA, June 7, 2015.
144. "Notre Dame dean biking across country to raise funds for rare disease," *Radio Iowa*, June 8, 2015.
145. "Road to Discovery rolls through IC," *CBS2/FOX 28*, Iowa City, IA, June 8, 2015.

146. "Q-C Area Briefs," *The Dispatch and Rock Island Argus*, Rock Island, IL, June 8, 2015.
147. "Cross country ride," *WHOTV/NBC*, Des Moines, IA, June 9, 2015.
148. "Cross-country cyclist raises funds for killer childhood illness," *Nebraska Radio Network*, June 11, 2015.
149. "Essential Pittsburgh: Cross country," *90.5 WESA (NPR)*, Pittsburgh, PA, June 12, 2015.
150. "University dean biking across U.S. to raise awareness, funds for rare disease," *Nebraska TV*, Kearney, NE, June 12, 2015.
151. "The path to battling cancer leads to an epic bike ride," *KETV ABC 7*, Omaha, NE, June 13, 2015.
152. "Family who lost three kids uses tragedy to raise awareness," *KUSA 9 News*, Denver, CO, June 16, 2015.
153. "Professor's 'Road to Discovery' goes through Granby," *Sky-Hi News*, Granby, CO, June 18, 2015.
154. "Dean rides 3,500 miles for rare disease; Stops in Reno," *KTVN CBS 2*, Reno, NV, June 23, 2015.
155. "Notre Dame dean rides bicycle through Ely on cross-country fundraiser," *Ely Times*, Ely, NV, June 26, 2015.

6.3. Significant Media Programs

(Brought two large national media outlets to the College of Science at Notre Dame to cover our research on a national stage.)

1. **Science Friday:** In celebration of 150 years of science at Notre Dame, the College of Science hosted a live taping of Science Friday on October 15, 2014 at 7p.m. in the DeBartolo Performing Arts Center. It was broadcasted two days later to an audience of about two million people through radio stations, podcasts, apps, and the Science Friday website. Three faculty from the College of Science were interviewed: Jeanne Romero-Severson, David Lodge and Philippe Collon, and over 850 people reserved or purchased tickets for the taping. You can view the entire event here: www.youtube.com/watch?v=2M17A6din8I
2. **Big Picture Science:** On February 4, 2015 the college welcomed the national radio show Big Picture Science to a packed auditorium in the Eck Visitor's Center. They interviewed Justin Crepp and Nitesh Chawla at the packed event. Big Picture Science aired the interviews on February 15. You can see Big Picture Science's coverage: http://bigpicturescience.org/episodes/Sesquicentennial_Science. Watch the whole show here: <https://www.youtube.com/watch?v=Fddk9gpzp2Q>.

7. PERSONAL

Born in Elyria, Ohio (near Cleveland, Ohio). Married 25 years and two daughters.

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