Title: Sustainable Water through Innovation in Membranes & Materials (SWIMM)

Lead Faculty: Stephen Martin (Chemical Engineering); Robert Moore (Chemistry)

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Department</th>
<th>College</th>
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<tbody>
<tr>
<td>Stephen Martin</td>
<td>Chemical Engineering</td>
<td>COE</td>
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<tr>
<td>Donald Baird</td>
<td>Chemical Engineering</td>
<td>COE</td>
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<tr>
<td>Luke Achenie</td>
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<td>COE</td>
</tr>
<tr>
<td>Sanket Deshmukh</td>
<td>Chemical Engineering</td>
<td>COE</td>
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<tr>
<td>Johan Foster</td>
<td>Materials Science &amp; Engineering</td>
<td>COE</td>
</tr>
<tr>
<td>Jason He</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
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<td>Peter Vikesland</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
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<td>Marc Edwards</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
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<tr>
<td>Andrea Dietrich</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
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<tr>
<td>David Dillard</td>
<td>Biomedical Engineering &amp; Mechanics</td>
<td>COE</td>
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<tr>
<td>Jack Lesko</td>
<td>Biomedical Engineering &amp; Mechanics</td>
<td>COE</td>
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<td>Robert Moore</td>
<td>Chemistry</td>
<td>COS</td>
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<tr>
<td>Tim Long</td>
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<tr>
<td>Judy Riffle</td>
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<tr>
<td>Amanda Morris</td>
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<tr>
<td>Shengfeng Cheng</td>
<td>Physics</td>
<td>COS</td>
</tr>
<tr>
<td>Kevin Edgar</td>
<td>Sustainable Biomaterials</td>
<td>CNRE</td>
</tr>
<tr>
<td>Klaus Moeltner</td>
<td>Agricultural &amp; Applied Economics</td>
<td>CALS</td>
</tr>
<tr>
<td>Kang Xia</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
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<tr>
<td>Ryan Stewart</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
</tr>
<tr>
<td>Brian Badgley</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
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<tr>
<td>Valisa Hedrick</td>
<td>Human Nutrition, Foods, and Exercise</td>
<td>CALS</td>
</tr>
<tr>
<td>Julia M. Gohlke</td>
<td>Population Health Sciences</td>
<td>Vet Med</td>
</tr>
<tr>
<td>Susan Duncan</td>
<td>Food Science and Technology</td>
<td>CALS</td>
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1. Vision Statement

In 2012, the United Nations reported that water scarcity affects every continent.\(^1\) Around 700 million people in 43 countries currently face water shortages or lack access to clean drinking water. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world’s population could be living under water stressed conditions. Water scarcity is mainly caused by overwhelming human consumption and contamination, from production of water-thirsty meats and vegetables, biofuel crop production, industrial uses, and rapid urbanization.\(^2\) The scale of water scarcity makes it an interconnected global issue and efforts to minimize the gap between water supply and demand are critical. Although over 70% of the surface of the earth is covered with water, less than 1% is easily accessible fresh water. Moreover, the distribution of fresh water is not even over the globe.\(^3\) Fresh water sources (e.g., rivers, lakes, groundwater) are increasingly being degraded below a usable quality for agriculture, industry, and drinking from anthropogenic inputs of inorganic (Anning and Flynn, 2012) and organic (Koplin et al 2002) contaminants. The generation and distribution of freshwater from non-potable fresh and saline sources has direct linkages to regional stability and global economic development.

Materials have an important role to play in water production, water reuse, and wastewater treatment, particularly for water purification via filtration, membrane separations, and advanced techniques such as electrodialysis. For example, total global desalination capacity has grown rapidly over the last decade and was projected to be over 100 million cubic meters (m\(^3\)) per day in 2016. This capacity is two-fold higher than global water production by desalination in 2008.\(^5,6\) Properly designed and implemented membrane processes can be energy efficient and easily scalable, thus making them an ideal replacement for more energy intensive processes such as multi-effect distillation. Significant materials challenges still remain to the production of economical membranes with high flux, high selectivity, and good chemical and physical stability. In addition, the specific requirements vary based on the source water (i.e., sea water, brackish water, wastewater, hydraulic fracturing water, degraded fresh water) and the application (i.e., drinking water, industrial cooling water, agricultural and irrigation water, and water for food production.) This demands a multidisciplinary approach wherein application area experts work closely with researchers synthesizing new materials and fabricating novel membranes.

2. Relevance

Virginia Tech is uniquely positioned for prominence in the development and application of materials for water purification and processing due to our internationally acknowledged strengths in polymer science and engineering (MII, Chemistry, Chemical Engineering, Materials Science and Engineering), water quality and treatment (Civil and Environmental Engineering, Water Interface IGEP, Crop & Soil Environmental Sciences, Biological Systems Engineering), and sustainability (Sustainable Nanotechnology IGEP, Sustainable Biomaterials, Green Engineering). For this effort we bring together the broad expertise of a diverse group of researchers, many of whom are well-known on the national and international stages. The research team is composed of faculty spread across a number of departments and colleges, and many are already involved in ongoing research collaborations and in current interdisciplinary initiatives. The team includes faculty from the colleges of Engineering, Science, Natural Resources & the Environment, and Agriculture & Life Sciences, and departments including those identified above as well as Physics, Materials Science & Engineering,, Biomedical Engineering & Mechanics, Human Nutrition, Foods, & Exercise, and Agricultural & Applied Economics.

The goal of this program is to approach materials research for water applications for the broad range of water users and consumers. The breadth of the research team provides the capacity to link together research from diverse disciplines and over multiple scales from experimental and computational to molecular design of new materials through device fabrication, scale-up and manufacturing, process and system level modeling, and economic, environmental, and health impact and life-cycle analysis.

**Relevance to GSS, the Materials SGA, and other Destination Areas:** SWIMM is directly aligned with the “abundance and quality of fresh water” critical problem area identified in the GSS destination area. In addition, SWIMM is aligned with the “Environment” research pillar in the nascent Materials
SGA, and has been selected as one of 5 core research thrusts for further development. SWIMM will contribute to both the research and teaching goals of the GSS destination area. The group will leverage existing expertise, facilities, and collaborations to develop a broad, interdisciplinary research initiative in the development of new materials, devices, and systems in the critical area of sustainable water production and processing.

The proposed research area is complementary to three current Destination Areas: Intelligent Infrastructure for Human Centered Communities (IIHCC), Global System Science (GSS), Data Analytics & Decision Sciences. We envision potential interactions with IIHCC through their efforts in Smart Design and Construction, as water purification, delivery, and wastewater treatment are key elements in this area. The quantification of impacts of water production, quality, and distribution requires the analysis of large data sets, so there is clear potential for interactions with DADS.

**Opportunities for Extramural Funding:** Interest in water purification cuts across multiple funding sources, including government agencies and industrial sponsors. NSF has recently instituted a program for Innovations at the Nexus of Food, Energy and Water Systems (INFEWS) and this is a natural fit for the SWIMM effort. NSF has also funded Engineering Research Centers in the water area, such as the ERC on Nanofiltration at Rice University. Our approach is distinct in that we are focused on membrane-based technologies for reverse osmosis, forward osmosis, and electrodialysis applications. The USDA has recently announced an Agriculture and Food Research Initiative (AFRI) RFP in the “Water for Food Production Systems Challenge Area”, which is a natural fit for the program. In addition, there are several programs at the DOE and DOE that can be targeted. Current interdisciplinary funding in these areas at Virginia Tech include the REU program in research at the Food-Energy-Water Nexus run by the Macromolecules Innovation Institute, and the NSF REU and RET programs in Water Science. With some investment, Virginia Tech will be well positioned to apply for a Center level grant (ERC or MRSEC) in the area of membrane-based water purification within the next 3-5 years.

3. **Curriculum Opportunities**

The SWIMM focus lends itself well to the development of interdisciplinary curricular programs in sustainable water production – efforts that tie in directly to ongoing initiatives such as Pathways to Knowledge, and the VT-shaped student concept of undergraduate education. Such an effort could include the development of a Pathways minor that ties together the social, economic, scientific, and policy issues associated with the production of potable water and the treatment of wastewater. In addition, faculty in SWIMM would take a lead role in the development of an interdisciplinary curriculum at both the undergraduate level aimed at providing students with the tools and knowledge necessary to tackle both the technical and non-technical issues associated with water production and treatment.

4. **Resource Needs**

**Current Resources to be Leveraged for SWIMM:**

- **Experimental Facilities and Expertise:**
  - Materials Synthesis: Laboratory facilities for new materials synthesis are available in CHE, Chemistry, Sustainable Biomaterials, and CEE.
  - Materials Characterization: Extensive capabilities for materials analysis and testing are available in CHE, Chem, CEE, and BEAM. In addition, the Nanoscale Characterization and Fabrication Laboratory (NCFL - ICTAS), the NSF sponsored NanoEarth Center, and the Macromolecular Materials Discover Center (MMDC - MII) provide state of the art characterization facilities accessible to users from around the university.
  - Membrane fabrication: Fabrication facilities for lab-scale membrane production are available in CHE, Chemistry, CEE.
  - Membrane Testing: Equipment for testing of lab-scale membranes (i.e., membrane permeation and selectivity) is available in CHE, CEE, and Chemistry.
  - Water purification system testing: Equipment for evaluating small-commercial scale membranes in water purification systems are available in CEE.
Water quality analysis: The Environmental Organic Chemical Analysis Service Center at CSES has state-of-the-art UPLC/tandem mass spectrometry, GC/tandem mass spectrometry, molecular microbiology lab for analyzing microbial indicators and microbiomes, and other essential equipments for water testing of for analyzing organic and microbial contaminants. CEE has a state-of-the-art environmental and water resources laboratory and analytical instrumentation for detection of inorganic and organic water and air quality parameters at part per trillion concentrations and above.

- **Modeling and Analysis:**
  - Significant expertise and capacity in molecular scale modeling (e.g., DFT, MD, CGMD), multi-scale modeling, optimization based approaches to inverse modeling, materials design and optimization, and process modeling exists in CHE and Physics.
  - Economic Modeling and Analysis expertise is drawn primarily from Agricultural and Applied Economics.

- **Social and Environmental Impact:**
  - VT has a strong track record in tying technology issues to relevant societal and environmental needs. We have identified faculty in various departments (e.g., CEE, Crop & Soil Environmental Science, Population Health Sciences, Food Science & Technology) whose expertise will allow SWIMM to identify needs and link developments in membrane materials and technology to specific social and environmental impacts.

**New resources needed:** Two primary interrelated gaps have been identified that must be filled in order to position SWIMM for national prominence. These gaps relate to the ability to transition materials and technologies from the lab scale to the pilot scale. First, only limited expertise is currently available in the area of large-scale membrane processing and manufacturing. A targeted faculty hire, preferably at the Associate or Full Professor rank, in the area of advanced manufacturing of membranes would fill this knowledge gap. Second, while lab scale membrane fabrication and testing facilities are available in several laboratories on campus, there are currently no larger pilot-scale facilities available. These facilities would allow the scale-up of new technologies from the lab scale (i.e., new membrane discovery) to the industrial scale, and would significantly increase VT’s visibility in the area. In addition, these facilities would increase the potential for collaboration with and funding from industrial partners. It is hoped that these facilities could be developed in collaboration with the Materials SGA and IIHCC destination area.

5. **Expected Outcomes**

  **Milestones and deliverables:** A significant goal of SWIMM is to foster increased interactions aimed at expanding current efforts in water purification, water quality, and membrane separations. As such, SWIMM will aim to hold quarterly meetings to generate dialog between interested faculty, as well as to identify specific opportunities for funding and outreach. These efforts will begin with a workshop this summer. We also anticipate the submission of a number of small (2-5 faculty) proposals starting in the first year of the program (e.g. NSF INFEWS, USDA-APRI). These will be aimed at increasing collaborative research interactions between faculty across department and college boundaries.

  **Impact:** SWIMM will impact the VT Materials community by fostering interdisciplinary collaboration and funding in the area of materials for water purification, in the hiring of a new faculty member focused on advanced manufacturing of membranes, through the development of a pilot-scale membrane fabrication and testing facility, and through the submission of numerous funding proposals culminating in Center-level proposals. These efforts will also serve to raise the national profile of VT’s research efforts in sustainable water and in materials development more generally.
Appendix I: Biosketches

Dr. Stephen M. Martin

Professional Preparation
- Princeton University; Chemical Engineering, B.S.E. 1999
- University of Minnesota – Twin Cities; Chemical Engineering, Ph.D. 2004
- Massachusetts Institute of Technology; Chemical Engineering, Post-doc 2004 – 2006

Appointments
- Associate Professor; Chemical Engineering, Virginia Tech 8/2013 - present
- Assistant Professor; Chemical Engineering, Virginia Tech 8/2006 – 8/2013
- Station Director – Novartis Station; David H. Koch School of Chemical Engineering Practice (MIT), 2006

Products Most Relevant to the Current Research

Other Significant Products
- S. Han, F. Rabie, E. Marand, S. M. Martin, Enantioselective Separations Using Supported Cholesteric Liquid Crystalline Membranes, Chirality, 2012, 24(7), 519-525.
- S. Han, S. M. Martin, Effect of Molecular Packing Density and Intermolecular Interactions on Solute Transport in Supported Liquid Crystalline Membranes, Liquid Crystal, 2012, 39(4), 441-449.
Appendix I: Biosketches

**Synergistic Activities**

- Developed and teaching a new course in *Soft Materials and Self-Assembly* at Virginia Tech taught in 2006, 2008, and 2014. The course has attracted students from a wide variety of technical backgrounds (e.g. chemical engineering, mechanical engineering, polymer science, chemistry, wood science).
- Instructor for the C-Tech² and Inspires summer programs at Virginia Tech – providing high school girls and middle school students with experiences in science and engineering in order to increase participation in STEM education.
- Session chair for sessions in the Interfacial Phenomena, Membranes, and Polymers divisions at the National Meeting of the American Institute of Chemical Engineering (2008 -2016).
- Reviewer of papers for ACS, Wiley, and Elsevier journals.
- Reviewer of proposals for NSF and ACS-PRF.

**Collaborators and co-authors (last 48 months)**

<table>
<thead>
<tr>
<th>Amanda Morris, Virginia Tech</th>
<th>Lixia Ruong, NSLS, NY</th>
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<tbody>
<tr>
<td>Eugene Joseph, Virginia Tech</td>
<td>Eva Marand, Virginia Tech</td>
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<td>Robert Moore, Virginia Tech</td>
<td>Michael Bortner, Virginia Tech</td>
</tr>
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**Graduate Advisors and Postdoctoral Sponsors**

- T. Alan Hatton (Post-Doc Advisor), Massachusetts Institute of Technology, MA
- Michael D. Ward (Graduate Advisor), New York University, NY

**Graduate Advisees**

- Christine J. Erdy, Savannah River National Lab, SC
- Dr. Sangil Han, Assistant Professor, Changwon National University, South Korea
- Dr. Michael J. Heinzer, Intel Corp., AZ
- Dr. Feras Rabie, PhD 2014
- Dr. Du Hyun Shin, PhD 2013, LG Chemical, South Korea
- Dr. Ninad Dixit, PhD 2015, Henkel Corp., NJ
- Dr. Waifong Chan, PhD 2015, Intel Corp, OR
- Dr. Carlos Landaverde, PhD 2016
- Alicia Pape, Virginia Tech (PhD est. spring 2016)
- Ethan Smith, Virginia Tech (PhD est. fall 2020)
Appendix I: Biosketches

Marc Andrew Edwards, Ph.D.
NRT Director
Charles Lunsford Professor of Civil & Environmental Engineering
Virginia Tech
edwardsm@vt.edu

(a) Professional Preparation

<table>
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<tr>
<th>Institution</th>
<th>City, State</th>
<th>Major</th>
<th>Degree</th>
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<tr>
<td>SUNY at Buffalo</td>
<td>Buffalo, NY</td>
<td>Bio-Physics</td>
<td>B.S.</td>
<td>1986</td>
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<tr>
<td>University of Washington</td>
<td>Seattle, WA</td>
<td>Environmental Engineering</td>
<td>M.S.E.</td>
<td>1988</td>
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<tr>
<td>University of Washington</td>
<td>Seattle, WA</td>
<td>Environmental Engineering</td>
<td>Ph.D.</td>
<td>1990</td>
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<tr>
<td>University of Washington</td>
<td>Seattle, WA</td>
<td>Environmental Engineering</td>
<td>Postdoc</td>
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(b) Appointments

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<th>Year</th>
<th>Position Description</th>
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<tr>
<td>2001-2021</td>
<td>Professor/Chaired Professor (Civil/Environmental Engineering, Virginia Tech)</td>
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<tr>
<td>1997-2001</td>
<td>Associate Professor (Civil/Environmental Engineering, Virginia Tech)</td>
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<tr>
<td>1992-1997</td>
<td>Assistant Professor (Civil/Environmental Engineering U. of Colorado)</td>
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<tr>
<td>1990-1991</td>
<td>Senior Engineer (James M. Montgomery Consulting Engineers)</td>
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(c) Five Most Significant Peer Reviewed Publications (out of 180 total)

i. Five Most Closely Related Publications


(d) Synergistic Activities

1. **Science and Engineering Ethics Education**: Co-creator of graduate class “CEE 5804: Engineering Ethics and the Public” on a National Science Foundation Ethics Education in Science and Engineering (EESE) grant with DC Citizen Science collaborator Lambrinidou. The class won a National Academy of Engineering Ethics Education Exemplar award 2016. Taught 6 ethics education full and half-day workshops to industry and academic audiences. Assisted Congressional Committee Investigations of the U.S. Centers for Disease Control (CDC) and United States Environmental Protection Agency (US EPA) and testified to Congress on unethical behavior of U.S. public health agencies in 2004, 2010 and 2016. Representative recorded public science-ethics addresses include VT Commencement (2008), TEDxVirginiaTech (2013), Hurley Medical Center (2015) and Virginia Tech Flint Water Study Team Presentation (2016). Citizen Science and social justice research work has been highlighted by the 2013 IEEE Barus Award for defending the public interest at great personal and professional risk, the NAE on-line engineering and science ethics center, Villanova University Praxis Award, the book *Engineering Peace and Justice*, the American Civil Liberties Union-Michigan, and others.

2. **Public-Inspired Science Research Collaborations and Advising**: Applying a Public-Inspired Science approaches to advising Dissertations and MS Thesis over the last 25 years, produced research collaborations with dozens of citizen scientists and industries including the American Water Works Association, Water Research Foundation, Copper Development Association, Mueller, International Associates of Plumbing & Mechanical Officials (IAPMO), Plumbing and Mechanical Institute, National Sanitation Foundation, United States Green Building Council, Green Building Alliance Beach Builders, Inc., Greenplumbers, Timmons, Alliance for Healthy Homes, U.S. Navy, hundreds of individual water utilities and building owners. Edwards’ 56 advisees have won 26 nationally recognized research awards for their graduate work. As a member of the VT Academy of Teaching and Advising Excellence, Edwards mentors junior faculty in research advising best practices.

3. **Virginia Tech Research Management**: Director of ICTAS Thrust Area Leader for Sustainable Water Research (2011-present). Seeded research efforts leading to over $15 million dollars of external funding for over 100 faculty on Virginia Tech campus.


5. Sloan Foundation Microbiology of the Built Environment (microBE) advisor on “Water Systems Microbiomes” and National Sanitation Foundation Committee 444 Prevention of Injury and Diseases Associated with Building Water Systems.
Appendix I: Biosketches

Donald G. Baird

Department of Chemical Engineering
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0257
Tel: (540) 231-5998   Fax: (540)231-2732
Email: dbaird@vt.edu

PROFESSIONAL PREPARATION

University of Wisconsin-Madison     ESM/ChE     PhD     1974
Michigan State University     Materials and Mechanics     MS     1970
Michigan State University     ChE/Mat     BS     1969

APPOINTMENTS

2009-present     Virginia Tech, Giacco Chair of Chemical Engineering
1997 - 2003     Virginia Tech, Co-director for the Center for Composite Materials and Structures
1990 - 2009     Virginia Tech, Harry C. Wyatt Professor of Chemical Engineering
1984 -1990     Virginia Tech, Professor of ChE
1981 -1984     Virginia Tech, Associate Professor of ChE
1978 -1981     Virginia Tech, Assistant Professor of ChE
1974 -1978     Monsanto Textiles Company, Pensacola, FL, research chemical engineer (high performance fibers)

Publications Most Relevant to Proposed Research


Other Significant Publications

1. Matthew D. Wilding and Donald G. Baird, “Melt processing and rheology of an acrylonitrile


**Synergistic Activities**
- Consulting and teaching of short courses to numerous companies: e.g. DuPont, Himont, Exxon/Mobil, Foster-Miller, Dutch State Mines(Netherlands), Himont(Italy), Corning, Coca-Cola, Procter & Gamble, Dow, Pactiv, 3M
- Editor of *Polymer Composites Journal* and on the editorial board of *Polymer Technology*
- Awards and Recognitions: e.g., Society of Plastics Engineer’s International (2009), Society of Plastics Engineer’s International Award for Research(2003); Society of Plastics Engineer’s International Award for Education(2002); Dean's Award for Excellence in Teaching; Dean’s Award for Excellence in Research(2002); Alumni Research Award(1991)

**Collaborators Over Last 48 Months**
Amod Ogale, Clemson; Ken Walters, Aberystwyth, Wales; T. McLeish, Leeds Univ.; Peter Foss, General Motors; Vlastimil Kunc, ORNL;

**THESIS ADVISOR/SPONSOR(LAST 5 YEARS)**
K. C. Ortman(PhD), Dow; M. Heinzer(PhD),Intel; C. Chen(PhD), SABIC; G. M. Velez-Garcia(PhD), ORNL; S. Mazahir(PhD), Celanese; J.T. Hofmann(PhD), Eastman; K.J. Meyers(PhD), Exxxon-Mobil; J. Quigley(PhD), Eastman; M. Cieslinski(PhD), BASF; K. Herrington(PhD), Braskem; C. Qian(PhD), Exxon-Mobil. Total students advised: 61 Postdoctoral Associates: 13
Appendix I: Biosketches

Brian D. Badgley
Crop & Soil Environmental Science, Virginia Tech
1880 Pratt Drive, Room 1121; Blacksburg, VA 24061
(540) 231-9629; badgley@vt.edu

(a) Professional Preparation

<table>
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<tr>
<th>Institution</th>
<th>Field</th>
<th>Degree</th>
<th>Year</th>
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<tr>
<td>University of Georgia</td>
<td>Zoology</td>
<td>B.S.</td>
<td>1995</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>Marine-Estuarine-Environmental Sciences</td>
<td>M.S.</td>
<td>2002</td>
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<tr>
<td>University of South Florida</td>
<td>Biology</td>
<td>Ph.D.</td>
<td>2009</td>
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<tr>
<td>University of Minnesota</td>
<td>Environmental Microbiology</td>
<td>Post-doc</td>
<td>2009-12</td>
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(b) Appointments

2012- Assistant Professor, Crop & Soil Environmental Science, Virginia Tech
2009-12 Post-Doctoral Associate, BioTechnology Institute, University of Minnesota
2002-04 Coastal Training Coordinator, Rookery Bay National Estuarine Research Reserve
2001-02 Sea Grant Fellow, NOAA, Estuarine Reserves Division
1996-97 Environmental Education Instructor, Jekyll Island 4-H Center, Jekyll Island, Georgia

(c) Products

(i) Related products (*student co-authors)


(ii) Other Significant Products


(d) Educational and Synergistic Activities

- **Virginia Tech Teacher of the Week** (2016)
- Participant in a year-long faculty development program delivered by the VT Network Learning Initiative focused on design and implementation of digital game-based learning tools for classroom instruction (2015-16)
- Participant in a year-long pilot program designed to explore and facilitate the use of inclusive teaching practices in the classroom for faculty with the College of Agriculture and Life Sciences (2015-16)
- Co-organized and hosted a workshop entitled “Strategies for sequence-based analyses of microbial communities (and the caveats)” which was attended by over 35 students, post-docs, and faculty from eight different departments across the Virginia Tech campus (2013)
- Cofounded a microbial ecology networking group of students and faculty at Virginia Tech to facilitate collaboration, discussion, and project development on campus (2012-ongoing)
Appendix I: Biosketches

KLAS MOELTNER
Professor, Department of Agricultural and Applied Economics
Virginia Tech, Blacksburg, VA 24061; Tel: (540) 231-8249; email: moeltner@vt.edu

Professional Preparation
Univ. of Life Sciences, Vienna, Austria MS Environmental Planning & Engineering, 1990
Monterey Institute of International Studies MA International Policy Studies, 1994
University of Washington MA Economics, 1998
University of Washington Ph.D. Economics, 2000

Appointments
2015- Professor, Department of Agricultural and Applied Economics, Virginia Tech
2011-2015 Associate Professor, Department of Agricultural and Applied Economics, V.Tech
2006-2010 Associate Professor, Department of Resource Economics, University of Nevada,
2000-2006 Assistant Professor, Department of Resource Economics, University of Nevada,

Publications
Related to Water:
Conservation by Relaxing Outdoor Watering Restrictions. *Journal of Economic Behavior &
Organization*, 107(A), 324-343.
Moeltner, K., R. Woodward (2009). Meta-Functional Benefit Transfer for Wetland Valuation:
Making the Most of Small Samples. *Environmental and Resource Economics*, 42 (1), p. 89-
109.

Other Recent:
Moeltner, K., C. Blinn, T. Holmes (forthcoming). Forest Pests and Home Values: The
Importance of Accuracy in Damage Assessment and Geocoding of Properties. *Journal of
Forest Economics*
Reliability to the Acceptance of Energy Infrastructure: Evidence from the EU, *Resource and
Energy Economics*
Local Opposition to new Transmission Lines across the EU-27, *Energy Journal*, 37(3)
Translating Commodities: Mountain Pine Beetles and Host Trees in the Colorado Front
Range. *Environmental and Resource Economics*, 63(3), 613-642
CloudSourcing: Using an Online Labor Force to Detect Clouds and Cloud Shadows in
Appendix I: Biosketches


A. Synergistic Activities
- Co-editor, Environmental and Resource Economics, 2013 – current
- Editorial Council, Journal of the Association of Environmental and Resource Economists
- Scientific Advisory Panel, EU-funded project “Securing the European Electricity Supply against Malicious and Accidental Threats (SESAME),” 2012 – 2015.

Collaborators & Other Affiliations

G. Amacher, S. Ball, C. Blinn, K. Boyle, J. Campbell, J. He, R. Jin, N. Lau, D. Lee, L. Resler, Y. Shao, V. Thomas, R. Wynne, Virginia Tech; T. Holmes, USFS; R. Johnston, Clark University; M.K. Keun, Utah State University; M. Kobayashi, World Bank; M.K. Price, Georgia State University; J. Reichl, M. Schmidtthaler, Energy Institute, Linz, Austria; K. Rollins, W. Yang, Univ. of NV, Reno; S.S. Stoddard, Truckee Meadows Water Association;

Graduate and Postdoctoral Advisors

G. Brown, R. Halvorsen, E. Rose, University of Washington

Thesis Advising (Chair or Co-chair)


Total number of graduate students advised (as Chair or Co-chair): 1 Master’s, 10 PhD
Appendix I: Biosketches

Dr. E. Johan Foster

(a) Professional Preparation

Simon Fraser University  
Department of Chemistry  
Canada  
Chemistry  
BSc 2002

Simon Fraser University  
Department of Chemistry  
Canada  
Chemistry  
PhD 2007

(b) Appointments

2016 - Present  
Thomas G. Digges and Thomas G. Digges, Jr. Faculty Fellow in Materials Science and Engineering  
Department of Materials Science and Engineering  
Virginia Polytechnic Institute and State University (Virginia Tech)

2014 - Present  
Associate Professor, Macromolecules Innovation Institute (MII)  
Virginia Tech Center for Sustainable Nanotechnology (VTSuN)  
Department of Materials Science and Engineering  
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia, United States of America

2014 - Present  
Long Term Tec21 Visiting Professor, Université Grenoble Alpes (Grenoble INP – PAGORA), Ecole internationale du papier, de la communication imprimée et des biomatériaux, Grenoble, France

2010 - 2014  
Maître-Assistant, Head of the Advanced Materials Group  
Polymer Chemistry and Materials, Adolphe Merkle Institute (AMI)  
University of Fribourg (UniFr), Fribourg, Switzerland

2007 - 2009  
Postdoctoral Research Fellow (w. Prof. Dr. E. W. ‘Bert’ Meijer), Department of Chemical Engineering and Chemistry, Technical University Eindhoven (TUe), Eindhoven, The Netherlands

2006  
Independent Lecturer, Department of Chemistry  
Simon Fraser University, Burnaby, Canada

(c) Publications

Top 5 publications most related to this proposal:


Appendix I: Biosketches

1. Session chair at 10 international symposia. Ranging from ACS to TAPPI meetings.


3. Faculty advisor for exchange programs to University of Fribourg (Switzerland), Université Grenoble Alpes (France) and University of Ghana, Legon (Ghana)

4. Outreach events: Roanoke Valley Governors School Visit to Virginia Tech; Virginia Science Festival “Nanotechnology is everywhere”

5. Center for the Enhancement of Engineering Diversity (CEED) talks and active membership, encouraging underrepresented minorities and women in STEM.


Top other 5 publications:


(d) Synergistic Activities

1. Session chair at 10 international symposia. Ranging from ACS to TAPPI meetings.


3. Faculty advisor for exchange programs to University of Fribourg (Switzerland), Université Grenoble Alpes (France) and University of Ghana, Legon (Ghana)

4. Outreach events: Roanoke Valley Governors School Visit to Virginia Tech; Virginia Science Festival “Nanotechnology is everywhere”

5. Center for the Enhancement of Engineering Diversity (CEED) talks and active membership, encouraging underrepresented minorities and women in STEM.
Appendix I:  Biosketches

JUDY S. RIFFLE

a.  Professional Preparation

Virginia Tech  Blacksburg, VA  Textiles  B.S./1973
Virginia Tech  Blacksburg, VA  Polymer Chemistry  Ph.D./1981

b.  Appointments

2000-present  Professor of Chemistry, Virginia Tech, Blacksburg, VA
2001-2015  Director, Macromolecular Science and Engineering Education, Virginia Tech, Blacksburg, VA
1994-2000  Associate Professor of Chemistry, Virginia Tech, Blacksburg, VA
1988-1994  Assistant Professor of Chemistry, Virginia Tech, Blacksburg, VA
1987-1988  Research Scientist and Visiting Assistant Professor of Chemistry, Virginia Tech, Blacksburg, VA
1985-1987  Vice President of Research and Development, Thoratec Laboratories Corp., Cardiovascular Materials, Pleasanton, CA
1983-1985  Manager of Materials Division, Thoratec Laboratories Corp., Cardiovascular Materials, Pleasanton, CA
1982-1983  Research Scientist, Union Carbide Corporation, Charleston, WV

c.  Products

Products Most Closely Related to the Proposed Project


Other Significant Products


Appendix I: Biosketches


d. Synergistic Activities

1. Graduate Education: Prof. Riffle strives to integrate research and education. She was the architect of Virginia Tech’s interdisciplinary graduate degree program in Macromolecular Science and Engineering (began accepting students in 2001), and she directed the program from it’s inception (2001-2015). She has served as PI and director of an IGERT program on high performance polymer composites for infrastructure. She has served as major professor for 42 PhD and 16 MS degrees. Of the 42 PhD degrees, 25 were to male students and 17 to female students. Six of the degrees were conferred to students from underrepresented groups. She now directs a graduate research group of 15 students. She has initiated 5 interdisciplinary graduate courses.

2. Undergraduate Education: Prof. Riffle is the PI and director of the Macromolecules and Interfaces Institute undergraduate NSF summer research programs (2015 marked the program’s 26 consecutive year).

3. Say YES (Youth Experiencing Science) to Science - K-12: Prof. Riffle has directed a middle school outreach summer program for the past 9 years. This comprises a week during each summer where the REU students mentor the K-12 students as they conduct science experiments and develop a project. The K-12 program culminates each summer when the young YES scientists present their projects to the community during Blacksburg’s annual Steppin’ Out street fair.

4. Contributions to Professional Societies: American Chemical Society, Division of Polymer Chemistry: Chair, Workshop Committee, 1999-2006; ACS National Awards Committee, 1998-2005; Chair, Nominations Committee, 1999; Chair, Long-Term Planning Committee, 1998; Past Chair, Division of Polymer Chemistry, 1998; Co-chair of Symposium on Dispersions: Fundamentals and Processing, 1997; Chair, Division of Polymer Chemistry 1997; Co-chair, National Graduate Research Conference, 1996; Chair, Macromolecular Secretariat Symposium on Composites, ACS National Meeting, 1995; Chair Elect, Division of Polymer Chemistry 1996; Vice Chair, Division of Polymer Chemistry 1995; Executive Board Member, 1991-2009; National Technical Programming Chair, 1991-93; Assoc. Editor, Polymer Preprints, 1986-1991.

Biographical Sketch: Amanda J. Morris

(a) PROFESSIONAL PREPARATION

Pennsylvania State University Chemistry B.S. May 2005
Johns Hopkins University Chemistry PhD August 2009
Princeton University Chemistry Postdoctoral Associate 9/09-8/11

(b) APPOINTMENTS

Virginia Tech Chemistry Assistant Professor 8/11 - present

(c) PUBLICATIONS

(i) Five publications most closely related to the proposed project:


(ii) Five other significant publications:


Appendix I: Biosketches

(d) SYNERGISTIC ACTIVITIES

3. Member of Chemistry Women Mentorship Network (ChemWMN) (2014-present)
5. Organized symposia for American Chemical Society Meetings:
   a. Vice Chair – Energy Division, Physical Chemistry (2017)
   b. Chair – Solid-State Division, Inorganic Chemistry (2017)
   c. ACS San Francisco – “Renewable Energy at the Interface between Theory and Experiment”
   d. ACS Denver – “Theoretical and Experimental Synergies at the Frontiers of Renewable Energy Catalysis”
   e. ACS DC – “Fundamentals of Metal Organic Framework Catalysis”
Biographical Sketch

Shengfeng Cheng
Department of Physics, Virginia Tech, Blacksburg, Virginia 24061-0435
Phone: (540) 231-5767; fax: (540) 231-7511; email: chengsf@vt.edu

(a) Professional Preparation

<table>
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<th>Institution</th>
<th>Location</th>
<th>Field</th>
<th>Degree</th>
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<tr>
<td>Nanjing University</td>
<td>Nanjing, China</td>
<td>Physics</td>
<td>B.S. 2000</td>
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<tr>
<td>Nanjing University</td>
<td>Nanjing, China</td>
<td>Physics</td>
<td>M.S. 2003</td>
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<tr>
<td>Johns Hopkins University</td>
<td>Baltimore, MD</td>
<td>Physics</td>
<td>Ph.D. 2010</td>
</tr>
<tr>
<td>Sandia National Laboratories</td>
<td>Albuquerque, NM</td>
<td>Computational Materials and Data Science</td>
<td>2010-2013</td>
</tr>
</tbody>
</table>

(b) Appointments

Assistant Professor          Physics Dept., Virginia Tech Since August 2013
Postdoctoral Appointee       Sandia National Laboratories 2010-2013

(c) Products

Relevant Publications


Other Significant Publications


(d) Synergistic Activities
Appendix I: Biosketches

- Proposal reviewer for the Petroleum Research Fund of American Chemical Society
- Session Chair of Session W41: Polymer Nanocomposites II at 2015 APS March Meeting and Session U31: Focus Session: Assembly & Function of Biomimetic & Bioinspired Materials III at 2013 APS March Meeting
- Co-Chair of 2014 Virginia Soft Matter Workshop II
Appendix I: Biosketches

DAVID A. DILLARD
Adhesive and Sealant Science Professor of Biomedical Engineering and Mechanics
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0219
Phone: (540) 231-4714 Email: dillard@vt.edu

A. Professional Preparation
University of Missouri-Rolla, Engineering Mechanics, B.S., 1976
University of Missouri-Rolla, Engineering Mechanics, M.S., 1978
Virginia Polytechnic Institute and State University, Engineering Mechanics, Ph.D., 1981

B. Appointments
Jan. 2004 – June 2004 Founder and Interim Director, Macromolecules and Interfaces Institute, Virginia Tech
May 1993 – Aug. 2006 Professor of Engineering Science and Mechanics, Virginia Tech
Summer 1992 National Taiwan University, Taipei, Taiwan, R.O.C.
May 1988 - May 1993 ASEE-NASA Fellow, NASA Langley Research Center

C. Publications:
(i) Five Publications Most Relevant to the Proposed Research
(ii) Five Other Significant Publications
Appendix I: Biosketches


D. Relevant Synergistic Activities

1. **Broad experience:** Professor Dillard has been active in the area of characterizing, designing with, and predicting the durability of polymeric materials for nearly 40 years, having industrial, academic, and government laboratory experience in the field, with a special focus in the area of adhesion science, where he has worked on a range of structural, microelectronic, and pressure sensitive adhesives, as well as sealants and other elastomeric systems.

2. **Interdisciplinary research, teaching, and outreach:** His work is often of an interdisciplinary nature, involving other faculty members and students from engineering, materials science, and chemistry. He regularly co-teaches academic credit courses as well as numerous industrial short courses with instructors from other departments, providing broad, interdisciplinary foundations to students and short course attendees (typically disseminating information to over 200 industrial employees each year.)

3. **Knowledge transfer:** He has transferred knowledge from research to the scientific community through over 175 refereed journal publications and more than 360 presentations at national and international venues, a number of which were invited. Technology transfer is a key component in many of his funded research projects, as demonstrated through successful implementation of techniques he developed.

4. **Recognition in the field:** Prof. Dillard is widely recognized in the adhesion science and mechanics communities, as exemplified by his sitting on the Editorial Board for the Journal of Adhesion, being elevated to Robert L. Patrick Fellow in the Adhesion Society and Fellow of ASME, and receiving the Adhesion Society’s 2010 Award for Excellence in Adhesion Science and the IOM3 2013 Wake Memorial Medal. Other recognition include a two-time winner of The Society of Wood Science and Technology’s George G. Marra Award of Excellence, ASTM Best Paper Award, Society for Experimental Mechanics Best Paper Award, two-time recipient of the Dean’s Award for Excellence in Research, and recipient of the Missouri University for Science and Technology’s Professional Degree.

5. **Leadership:** For over six years, Dr. Dillard served as the Director of the Center for Adhesive and Sealant Science at Virginia Tech, an interdisciplinary group of engineers, chemists, and material scientists involved in annual research expenditures approaching $4 million. In this role he worked to encourage the interdisciplinary collaboration that is required for many research aspects in the field of adhesion science. He continues to interact with many students and faculty, and has worked to develop programs to encourage participation by under-represented groups in activities of the Center and its successor, the Macromolecules and Interfaces Institute, which he led in founding. He is a past president of the Adhesion Society.
Appendix I:  Biosketches

SUSAN E. DUNCAN, Ph.D., R.D.
Associate Director, Virginia Agricultural Experiment Station
Professor, Food Science and Technology
104C Hutcheson Hall
Virginia Tech
Blacksburg, VA 24061-0418; duncans@vt.edu

PROFESSIONAL PREPARATION

The Ohio State University      Food Technology (Honors)      B.S. 1981
Indiana University of Pennsylvania Human Nutrition and Foods  M.S. 1987
The University of Tennessee      Food Science and Technology  Ph.D. 1989

RELATED QUALIFICATIONS
Registered Dietician
The American Dietetic Association, Commission on Dietetic Registration, 1987-present

APPOINTMENTS (All at Virginia Tech)
•  Associate Director, Virginia Agricultural Experiment Station, 2016-present
•  Professor, Department of Food Science and Technology, 2004-present
•  Co-Director, Water INTERface Interdisciplinary Graduate Education Program, 2014-present
•  Director, Macromolecular Interfaces with Life Sciences NSF IGERT Program, 2004-2011
•  Associate Professor, Department of Food Science and Technology, 1996-2004.
•  Assistant Professor, Department of Food Science and Technology, 1990-1996.

PUBLICATIONS (Selected, from last 5 years): graduate students and post-docs marked with +; undergraduates underlined.

Emphasis: Packaging + Water + Biological Fluids + Health
Appendix I: Biosketches


SYNERGISTIC ACTIVITIES

1. **Education: Ph.D. Training:** Co-Director (2014-present) and Co-Principal Investigator, Virginia Tech Water INTERface Interdisciplinary Graduate Education Program (IGEP; 2011-present, 21 graduate students (17 PhD)); Director and Principal Investigator for the NSF Macromolecular Interfaces with Life Sciences (MILES) IGERT (2004-2011; 35 PhD IGERT students plus 4 affiliated PhD IGERT students and 20 SURP students. **Curriculum Development and Instruction:** Developed 4 multidisciplinary MILES courses and a graduate certificate program approved through the university. Assisted in curriculum development for Water INTERface IGEP graduate certificate, courses and served as co-instructor in the Water INTERface IGEP Water for Health seminar course (2011, 2013, 2015). Co-Principal Investigator, REU Site: Materials Innovation at the Intersection of Food-Energy-Water Systems (MII FEWS), NSF (2016-2019; 12 undergraduate students to date)

2. **Outreach: K-12:** MILES IGERT contributor to the Mentoring Academic Growth in the Community (MAGIC) outreach program with the Science Museum of Western Virgina (2005-10); coordinated activities and hosted middle school students in the Department of Food Science and Technology (2007-09), with demonstrations pertaining to sensory quality and analytical measurements; mentored a home schooled 9th grader for regional science fair (2012). **Industry:** Provide technical expertise to the dairy, food & beverage, and packaging industries related to sensory evaluation, quality, and packaging through contractual grants and independent interactions. **Professional Service:** Member, Board of Directors of the American Dairy Science Association (2011-14), Vice President (2014-15), President (2015-16).

3. **Research:** Recognized expert in sensory evaluation of food (beverage)-packaging interactions and oxidation-based, including photo-induced, reactions in biological fluids, beverages and foods; expertise in sensory evaluation of metallic flavor pertaining to water, foods and health; consumer insights pertaining to food, water, packaging.
Appendix I: Biosketches

Julia M Gohlke
Asst. Professor, Environmental Health
Department of Population Health Sciences
205 Duck Pond Drive MC 0395
Virginia Tech
Blacksburg, VA 24061-0395; jgohlke@vt.edu

Professional Preparation
University of Michigan  Biology  B.S.  1997
University of Washington  Environmental Health/Public Hlth  M.S.  2001
University of Washington  Toxicology/ Env Health  PhD  2004
NIEHS/NIH  Biostats/Bioinformatics/Env Hlth  Post-doc 2009

Appointments
Assistant Professor  Virginia Tech, Dept. Population Hlth Sci  2015 to present
Assistant Professor  Univ of Alabama at Birmingham, Dept Env Hlth Sci  2010 - 2015
AAAS Fellow  U.S. Department of State, Washington DC  2009 - 2010
Temporary Advisor  World Health Organization, Switzerland  2008

Products
Dr. Gohlke has authored 40 peer-reviewed scientific publications and 10 book chapters/technical reports.

Five Products most closely related:

Five Other Recent Significant Products:
Appendix I: Biosketches


**Synergistic Activities**

1. **Outreach:** Several of our CDC and NIH funded research projects take a community-engaged approach, working with organizations in underserved communities in Birmingham and Black Belt counties in Alabama and Tazewell Cty, Virginia. We have established advisory boards made up of community and local government members, as well as academic representation to determine research goals.

2. **Education:** I have taught a graduate level environmental health and human health risk assessment for 6 years exploring the intersection between human health sciences (toxicology), epidemiology, environmental policy and economics.

3. **International Activities:** Developed and put on a lessons learned workshop from the Deepwater Horizon oil spill to build capacity in Ghana, a country that has begun deepwater oil drilling. Mentored a Fulbright PhD student from Ghana.

4. **Service:** Grant reviewer for NIH Climate Change and Health Panel, NASA Health and Air Quality Applied Sciences, NIOSH Centers for Agricultural Health and Safety, EPA STAR Graduate Fellowship Program, Human Health Risk Assessment Public Health Panel, NSF Graduate Research Fellowship Program, NSF Geography and Spatial Sciences Program, Army Corps of Engineers Engineer Research and Development. Served as Editorial Board Member for *Reproductive Toxicology* and *Journal of Health and Pollution*.

**Collaborators**

Virginia Tech: Linsey Marr, Susan Marmagas, Leigh-Anne Krometis, Korine Kolivras, Molly Richardson, Samarth Swarup, Dawen Xie, Jim Bohland, Emily Satterwhite

University of Alabama at Birmingham: Mary B Evans, David B Allison, Claudiu Lungu, Stephen A Watts

Johns Hopkins University: Benjamin F Zaitchik, Tiffany Smith, Anna Scott

Drexel University: Leslie A McClure

Auburn University: Tonia S Schwartz

Texas Tech University: John A Dawson

**Graduate and Postdoctoral Advisors:** Christopher J Portier, retired, previous at NIEHS and CDC and Elaine M Faustman, University of Washington

**Graduate Student and Post-doc Advisees:** Post-docs: Shia Kent, Tonia S Schwartz, Yuhaow Wu, Molly Richardson PhD students: Molly C Bernhard, Dzigbodi Doke MS students: Jordan E Roberts, Sherri Hudson
Appendix I: Biosketches

VALISA E. HEDRICK
Assistant Professor, Human Nutrition, Foods and Exercise
295 West Campus Drive
Virginia Tech
Blacksburg, VA 24061; vhedrick@vt.edu

PROFESSIONAL PREPARATION

Virginia Tech

Human Nutrition and Dietetics
BS 2006

Registered Dietitian Nutritionist
RDN 2007

Clinical Human Nutrition
PhD 2011

Behavioral Human Nutrition
Post-doc 2011-2014

APPOINTMENTS

• Assistant Professor, Human Nutrition, Foods, and Exercise, Virginia Tech, 2014-present

PRODUCTS: Dr. Hedrick has published 21 products in the peer-reviewed literature.

FIVE MOST CLOSELY RELATED *= student advisee


• Hedrick VE, Davy BM, Myers EA*, You W, Zoellner JM. Changes in the Healthy Beverage Index in Response to an Intervention Targeting a Reduction in Sugar-Sweetened Beverage Consumption as Compared to an Intervention Targeting Improvements in Physical Activity: Results from the Talking Health Trial. Nutrients, 2015 (7), 101168-10178.


5 OTHER SIGNIFICANT RELEVANT PRODUCTS


• Hedrick VE, Zoellner JM, Jahren AH, Woodford NA, Bostic J, Davy BM. A dual carbon and nitrogen stable isotope ratio model is not superior to a single carbon stable isotope ratio model for
Appendix I: Biosketches


**SYNERGISTIC ACTIVITIES:**

- Co-Instructor of Virginia Tech’s Water INTERface seminar course (2016), an Interdisciplinary Graduate Education Program that integrates students and faculty in the departments of Human Nutrition, Food, and Exercise; Civil and Environmental Engineering; and Food Science and Technology. Guest lecturer for the Water INTERface Interdisciplinary Research Course (2017).
- Executive Committee Member, Research Dietetics Practice Group, Academy of Nutrition and Dietetics (2016-present).
- Reviewer:
  - United States Department of Agriculture’s Economic Research Service
  - Center for Disease Control, Preventing Chronic Disease
  - Nutrition Journal
  - Public Health Nutrition
  - Nutrients
  - British Journal of Nutrition
- Invited presentations

**COLLABORATORS AND CO-AUTHORS**

- **Virginia Tech**
  - Brenda Davy
  - Wen You
  - Elena Serrano
  - Andrea Dietrich
  - Tina Savla
  - Kiyah Duffey
  - Richard Winett
  - Andrew Neilson
  - Osman Balci
  - Susan Duncan

- **External Collaborators**
  - Jamie Zoellner, University of Virginia
  - Jennie Hill, Gretchen Swanson Center
  - Tanya Halliday, University of Colorado
  - Paul Estabrooks, University of Nebraska
  - A. Hope Jahren, University of Oslo
  - Hollie Raynor, University of Tennesseese
  - Yvonnes Chen, University of Kansas
  - Susan Swithers, Purdue University
  - Karina Lora, University of Connecticut

**GRADUATE ADVISEES**

- Erin M. Passaro, MS (2016) Dietetic Intern with the Medical University of South Carolina
- Molly C. Bremer (expected MS 2017) Future: Dietetic Intern with the University of Virginia
- Erica L. Hess (expected MS 2017) Future: Dietetic Intern with the Medical University of SC
- Emily A. Myers (expected PhD 2018)
- Natalie A. Kruzliakova (expected PhD 2018)
- Anna G. Fausnacht, MPH (expected PhD 2020)
Appendix I: Biosketches

Zhen He, Ph.D.

Department of Civil and Environmental Engineering
Virginia Tech
1145 Perry St.
Blacksburg, VA 24061

Phone: (540) 231-1346
Fax: (540) 231-7916
E-mail: zhenhe@vt.edu
Web: https://ebl.cee.vt.edu

Professional Preparation

- Tongji University, Environmental Engineering, B.S., 2000
- Technical University of Denmark, Environmental Engineering, M.S., 2003
- Washington University in St. Louis, Environmental Engineering, Ph.D., 2007

Appointments

- 2013 – present: Associate Professor, Department of Civil and Environmental Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA
- 2009 – 2013: Assistant Professor, Department of Civil Engineering and Mechanics, University of Wisconsin – Milwaukee, Milwaukee, WI
- 2007 – 2009: Postdoctoral Research Associate, University of Southern California, Los Angeles, CA

Five Relevant Products


Appendix I: Biosketches

Other Significant Products

Synergistic Activities:

Major Courses Developed/Taught
Introduction to Environmental Engineering (UG), Freshwater Engineering (G), Environmental Biofuel and Resource Recovery (G), Hazardous Waste Management (UG/G), Bioelectrochemical Systems for Environmental Engineering (G)

Professional Affiliations, Honorary Societies, and other Honors
Vice Chair of Research and Innovation Committee, Water Environment Federation, Association of Environmental Engineering and Science Professors, International Water Association, American Association for the Advancement of Science

Reviewing
Manuscript reviewer for more than 35 journals (> 400 manuscripts)
Proposal reviewer for NSF Energy for Sustainability, NSF PIRE, NSF Environmental Sustainability, USDA SBIR, Research Foundation Flanders, HongKong ITSP

Editorial Activities
Associate Editor, *Water Environment Research*
Appendix I: Biosketches

Ryan D. Stewart, Ph.D., E.I.T.
Assistant Professor
Crop and Soil Environmental Sciences
Virginia Tech, Blacksburg, VA 24061
Email: ryan.stewart@vt.edu
Phone: (540) 231-0253 Fax: (540) 231-3431

a. Professional Preparation
California Polytechnic State U. Mechanical Engineering B.S. 2002
Oregon State University Water Resources Engineering M.S. 2010
Oregon State University Water Resources Engineering Ph.D. 2013
Oregon State University Post Doctoral Scholar 2013

b. Appointments
Since 2014 Assistant Professor, Virginia Tech

c. Products
Five relevant publications


Five other publications of significance


Appendix I: Biosketches


**d. Synergistic Activities**


2. **Reviewer**: Panel Member, National Science Foundation, Engineering Directorate, CBET Division (2016; 2017); Panel Member, National Science Foundation, Geosciences Directorate, Graduate Research Fellowship Program (2015); Journal Reviewer (34 total in 19 different journals).

3. **Committee Member**: S483 Don and Betty Kirkham Soil Physics Award, Soil Science Society of America Soil Physics and Hydrology Division (2016-present); Virginia Tech, College of Agriculture and Life Sciences, Graduate Education Committee for the proposed School of Plant and Environmental Sciences (2015-2016); Virginia Tech, Crop & Soil Environmental Sciences Dept., Graduate Seminar Committee (2014-present)

4. **Member**: Multi-State Project W3188: Environmental Soil Physics (2014-present)
Appendix I: Biosketches

**Kang Xia**  
Professor in Environmental Chemistry  
Department of Crop & Soil Environmental Sciences  
Virginia Tech  
1880 Pratt Dr., Virginia Tech Cooperate Research Center, Blacksburg, VA 24061  
Phone: (540)231-9323  Fax: (540)231-3431  Email: kxia@vt.edu

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<th>a. Professional Preparation</th>
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<td>Beijing Agricultural University</td>
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<td>Louisiana State University</td>
<td>Soil Chemistry</td>
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<tr>
<td>University of Wisconsin-Madison</td>
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<td>University of Wisconsin-Madison</td>
<td>Environmental Chemistry</td>
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<th>b. Appointments</th>
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<tr>
<td>2016 to present</td>
<td>Professor, Dept. Crop &amp; Soil Environ. Sci., Virginia Tech</td>
</tr>
<tr>
<td>2011 to 2016</td>
<td>Associate Professor, Dept. Crop &amp; Soil Environ. Sci., Virginia Tech</td>
</tr>
<tr>
<td>2006 to 2011</td>
<td>Director for Research Division and Industrial and Agricultural Services Division, Mississippi State Chemical Laboratory</td>
</tr>
<tr>
<td>2010 to 2011</td>
<td>Associate Professor, Dept. of Chemistry, Mississippi State University</td>
</tr>
<tr>
<td>2006 to 2010</td>
<td>Assistant Professor, Dept. of Chemistry, Mississippi State University</td>
</tr>
<tr>
<td>2002 to 2005</td>
<td>Assistant Professor, University of Georgia</td>
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<td>1998 to 2001</td>
<td>Assistant Professor, Kansas State University</td>
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<td>1997 to 1998</td>
<td>Postdoctoral Researcher, University of Wisconsin-Madison</td>
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<th>c. Publications</th>
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<td><em>out of 52 peer-reviewed journal publications and book chapters</em></td>
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**5 most related:**


**5 other significant publications:**
Appendix I: Biosketches


d. **Synergistic Activities**

Major advisor for graduate students in environmental chemistry; Panel member of the USDA Soil Process Program; Reviewer of approximately 20 papers and proposals every year; Associate Editor for Journal of Environmental Quality. Conduct interdisciplinary research to investigate mineral surface reactivity and soil organic C and N dynamics using synchrotron-based spectroscopic techniques, to study the environmental fate of emerging contaminants in animal waste and biosolids-affected soil and water environment, and to develop chromatographic analytical methods for detecting trace level organic contaminants.
Appendix I: Biosketches

Timothy E. Long
Department of Chemistry, Virginia Tech, Blacksburg, VA 24061
540-231-2480; telong@vt.edu

A. Professional Preparation
St. Bonaventure University Chemistry B.S., 1983
Virginia Tech Chemistry Ph.D., 1987

B. Appointments
2014 Director, Macromolecules Innovation Institute
2011 Associate Dean for Research and International Outreach, College of Science
2009 Associate Director Interdisciplinary Research and Education, Fralin Institute, Virginia Tech
2003 Professor of Chemistry, Virginia Tech
2001 Associate Professor of Chemistry, Virginia Tech
1999 Assistant Professor of Chemistry, Virginia Tech
1993 Principal Research Chemist, Eastman Chemical Company, Kingsport, TN
1993 Senior Research Chemist, Eastman Kodak Company, Kingsport, TN
1991 Advanced Technical Program Researcher (ATP, sponsored by NIST)
1990 Senior Research Scientist, Eastman Kodak Company, Rochester, NY
1987 Advanced Research Scientist, Eastman Kodak Company, Rochester, NY

C. Publications
(i) Publications Related to the Proposed Project

(ii) Other Significant Publications
Appendix I: Biosketches


D. Synergistic Activities
PI of $350k NSF REU *Materials Innovation at the Intersection of Food-Energy-Water Systems* with 13 faculty from 7 departments at Virginia Tech; PI or Co-PI of $3.4M funds in 2016 for polymer synthesis research projects, including 3D printing, additive manufacturing, and materials characterization; Participated in an intensive collaborative research exchange with Waseda U., Tokyo, Japan and San Sebastian, Spain (since 2004) as part of a university initiative to establish international research & student exchange programs. Appointed as Director of the Macromolecules Innovation Institute at Virginia Tech in 2014 with responsibilities for interdisciplinary research & education in polymer sciences across the campus.

E. Collaborations
(i) Recent Collaborators and Co-Editors (w/affiliations, alphabetical, coeditors/chairs)
R. Bunyard (Kimberly Clark Corp), K. Caster (ARO), T. Chen (ExxonMobil), R. Colby (Penn State), D. Cotsakis (Carlisle), C. Dejesus (Henkel), J. Elabd (Drexel U.), K. Haider (Bayer Material Science), R. Jensen (ARL), D. Kiserow (ARO), J. Messman (Honeywell), H. Nishide (Waseda U.), R. Odle (SABIC), J. Orlicki (ARL), A. Rawlett (ARL), A. Schneller (BASF), J. Snyder (ARL), B. Voit (IPF Dresden), C. Willis (Kraton), K. Winey, (UPenn), E. Yilgor, L. Yilgor (Koc U), Q. Zhang (Penn State).

(ii) Graduate Advisors and Postdoctoral Sponsors
PhD Advisor: Prof. James McGrath, Virginia Tech.

(iii) Thesis Advisor and Postgraduate-Scholar: (Current students, VT) Joe Dennis, Justin Sirrine, Mingtao Chen, Ryan Mondshein, Allison Pekkanen, Katherine Valentine, Kevin Drummey, Philip Scott, Emily Wilts, Tyler White, Clay Arrington, Josh Wolfgang. (Recent former students, VT) Alison Schultz (Owens Corning), Evan Margareta (Sun Chemical) Keren Zhang, (Dow), Ashley Nelson (HARL), Chanioka Jangu (3M), David Inglefield (Eastman Chemical), Sean Hemp (Michelin), Daniel Buckwalter (Owens Corning), Eveline van der Aa (unemployed), Matthew Hunley (DuPont), Mana Tamami (Lubrizol), Steven June (3M), Shijing Cheng (3M), Matthew Green (Arizona State U.), Tianyu Wu (Bausch & Lomb), Renlong Gao (PPG), Michael Allen (Adhesives Research), Nancy Zhang (IBM Almaden). (Recent Post-graduate scholars) Daisuke Yamamoto (Toray), Makito Yokoe (Toray), Asem Abdallahad (Jefferson College of Health Science), Zhiyang Zhang (VT), Sachin Bobade (EMD), Nicholas Moon (Milliken), Maruti Hegde (VT), Jana Herzberger (VT).

(iv) Total Students and Postdocs: 82
Appendix I: Biosketches

LUKE E. K. ACHENIE
Professor, Department of Chemical Engineering, Virginia Tech
Tel: (540) 231-4257 • Fax: (540) 231-5022 • Email: achenie@vt.edu

A. PROFESSIONAL PREPARATION
Massachusetts Institute of Technology, Cambridge, MA, Chemical Engineering, B.S., 1981
Northwestern University, Evanston, IL, Engineering Science, M.S., 1982
Carnegie Mellon University, Pittsburgh, PA, Chemical Engineering, Ph.D., 1988

B. APPOINTMENTS
1/14 – Present Virginia Tech, Professor of Health Sciences.
1/12 – 1/13 Program Director, NSF/CBET/PRF
8/07 – Present Virginia Tech, Professor of Chemical Engineering.
8/04 – 8/07 University of Connecticut, Professor
9/97 – 8/94 University of Connecticut, Associate Professor
9/91 - 8/97 University of Connecticut, Assistant Professor
8/88 – 7/91 Shell Development Company, Associate Research Engineer

C. PRODUCTS [FIVE PRODUCTS MOST CLOSELY RELATED TO THE PROPOSED PROJECT OUT OF OVER 160]

D. PRODUCTS [FIVE OTHER SIGNIFICANT PRODUCTS]

E. SYNERGISTIC ACTIVITIES
1. I am the current 2017 Chair of the IC (International Committee), a committee within the American Institute of Chemical Engineering (AIChE). The committee helps with the globalization efforts of the AIChE.

2. I was the 2015 Chair of MPPG, a committee within the American Chemical Society (ACS). The committee decides on the themes for ACS Meetings. For example in the Spring (San Diego) meeting, the theme is “Computers in Chemistry” – I proposed and supported this theme four years ago and it was adopted for Spring 2016.


4. GSAS-Qatar Global Conference (invited speaker on molecular modeling), Doha, Qatar, July 2012.


F. COLLABORATORS & OTHER AFFILIATIONS (past 48 months)
Ranga Pitchumani (Virginia Tech); Chris Roy (Virginia Tech); Ted Oyama (Tokyo University/Virginia Tech); Foster Agblevor (Utah State University); Yon Woo Lee (Virginia Tech); Angela Scarpa (Virginia Tech).

(2). GRADUATE STUDENTS
PhD Maryam Moarefian (Virginia Tech, Current); Jamelle Simmons (Virginia Tech, Current); Chris Christie (Virginia Tech), Quan Yang (Post Doc in China), Naresh Pavurala (USDA post-doc), Zhenxing Wang (postdoc at Prof. Brian Laird’s Lab, Chemistry Dept. University of Kansas), Andres Fernando Barrios Gonzales (Associate Professor, Univ. de Los Andes, Columbia); Rishi Gupta (Senior Research Scientist, Abbvie, Chicago IL); Shaoduan Ou (Assistant Professor, School of Energy and Power Engineering, Central South University, Changsha Hunan, China), Arunprakash Thirugnanam (Assistant Professor, Univ. of Colorado, Denver, CO); Ozlem Yilmaz (Research Scientist); Yousef Sharifi; Ivan Datskov (Research Engineer, OSISoft 777 Davis Street, Suite 250, San Leandro, CA 94577); Manish Sinha (Staff Research Engineer, General Motors, Rochester, NY); Yiping Wang (Research Engineer, Infineon, 6179 Pond Grass Rd Mechanicsville, VA 23111); Sanjeev Garg (Professor, IIT/Kanpur), Michael Butkus (Professor, joint with Dominic Grasso), H.K. Oh (joint with Norman Garrick).

MS Chris Christie (Virginia Tech), Quan Yang (Virginia Tech), Naresh Pavurala (Virginia Tech), Nuttapol Lerkkasemsan (Virginia Tech); Christina Geras (UTC Power); Charles Acquah (PhD candidate, UConn); Ozlem Yilmaz (Research Scientist); Yousef Sharifi; Amit Prasad; Ioana Stanescu; Nick Antonopoulos (UTC Fuel Cells, East Windsor, CT); Shaoduan Ou (PhD candidate, UConn); Arunprakash Thirugnanam (USEPA, NRC, Cincinnati, OH); Mohammad Hussein (Texas Tech), Ivan Datskov (Research Engineer, OSISoft 777 Davis Street, Suite 250, San Leandro, CA 94577); Sanjeev Garg (Assistant Professor, IIT/Kanpur), Yan Wan, Scott Ferrigno, Pennangaram Devika, Amit Duvedi, Nachiket Churi, Bhuven Wankarkar, Anand Karlapakkam, Vinod Kalikiri, Sandhya Paladugu, Michael Rouns, (Engineer, Pfizer, Groton, CT.), Jaeyong Myung.
Appendix I: Biosketches

Sanket A. Deshmukh
Department of Chemical Engineering, Virginia Tech

Professional Preparation
University of Pune, India Chemistry B.S. 2002
University of Pune, India Polymer Science M.S. 2004
University College Dublin, Ireland Chemical & Bioprocess Engineering Ph.D. 2009
Argonne National Laboratory, USA Center for Nanoscale Materials Postdoc, 2010-2015
North Carolina State University, USA Materials Science and Engineering Postdoc, 2015-2016

Appointments
2016-Present Assistant Professor, Department of Chemical Engineering, Virginia Tech, Blacksburg, VA
2015-2016 Postdoc, Materials Science and Engineering Department, North Carolina State University, Raleigh, NC
2010-2015 Postdoc/Visiting Scientist, Center for Nanoscale Materials, Argonne National Laboratory, IL
2004-2006 Project Assistant II, National Chemical Laboratory, Pune, India

Related Publications

Other Significant Publications
1. D Berman, SA Deshmukh, B Narayanan, SKRS Sankaranarayanan, Z. Yan, A. A. Balandin, A. Zinovev, D. Rosenmann, A. V. Sumant, “Metal-induced rapid transformation of diamond into single and multilayer graphene on wafer scale” Nature communications, 7 (2016), 12099, DOI: 10.1038/ncomms12099


**Synergistic Activities**
1. Organizer of workshops for users of computing facilities at the Argonne National Laboratory.
2. Reviewer of funding agencies: ACS Petroleum Research Funds
3. Panelist at various review meeting organized by DOE’s Office of Basic Energy Science.

**Collaborators and Co-editors**
Katsuniko Ariga (NIMS); Gary Baker (University of Missouri–Columbia); Alexander Balandin (UC-Riverside); Ganesh Balasubramanian (Iowa State University); Diana Berman (University of North Texas); Daniel Bowron (Rutherford Appleton Laboratory); Darryl Butt (Boise State University); Samantha Callier (Rutherford Appleton Laboratory); Jesse Clark (SLAC National Accelerator Laboratory); Larry Curtiss (Argonne National Laboratory); Richard Cutler (Boise State University); William David (Rutherford Appleton Laboratory); An Erdemir (Argonne National Laboratory); Nicola Ferrier (Argonne National Laboratory); H. Christopher Fry (Argonne National Laboratory); Stephen Gray (Argonne National Laboratory); Benjamin Hanson (North Carolina State University); Ross Harder (Argonne National Laboratory); Jinbo He (University of Chicago); Phay Ho (Argonne National Laboratory); Joshua Huether (Boise State University); Heinrich Jaeger (University of Chicago); Qian Jiang (Tianjin Polytechnic University); Zhang Jiang (Argonne National Laboratory); Ganesh Kamath (InterX Inc.); Pongsakorn Kanjanaboot (University of Chicago); Jong Woo Kim (UC-San Diego); Kah Chun Lau (Argonne National Laboratory); Yueling Li (Argonne National Laboratory); Zheng Li (Argonne National Laboratory); Chi-Kai Lin (Argonne National Laboratory); Xiao-Min Lin (Argonne National Laboratory); Derrick Mancini (Illinois Institute of Technology); Stephen Martin (Virginia Tech); Evan Maxey (Argonne National Laboratory); Dean Miller (Argonne National Laboratory); Amanda Morris (Virginia Tech); Paul Mulvaney (University of Melbourne); Badri Narayanan (Argonne National Laboratory); Riley Parrish (Boise State University); Melissa A Pasquinelli (North Carolina State University); Vilas Pol (Purdue University); Shiriram Ramanathan (Harvard University); Daniel Rosenmann (Argonne National Laboratory); Subramaniam Sankaranarayanan (Argonne National Laboratory); Kiran Sasikumar (Argonne National Laboratory); Mehdi Shakourian-Fard (University of Missouri–Columbia); Oleg Shpyrko (UC-San Diego);

**Graduate Advisor and Post-doctoral Sponsor**
Doctoral: Prof. Damian A. Mooney, Chemical and Bioprocess Engineering, University College Dublin, Ireland,
Postdoctoral: 1. Prof. Yarooslava Yingluh, Materials Science and Engineering Department, North Carolina State University, Raleigh, NC
2. Dr. Subramaniam Sankaranarayanan, Center for Nanoscale Materials, Argonne National Laboratory

**Current Funding**
1. Virginia Tech Start-up Funds
2. ICTAS Diversity and Inclusion Seed Grant ($10,000).
Appendix I: Biosketches

ANDREA M. DIETRICH
Professor, Civil and Environmental Engineering
Adjunct Professor, Food Science and Technology
1145 Perry Street, MC 00246
413 Durham Hall
Virginia Tech
Blacksburg, VA 24061; andread@vt.edu

PROFESSIONAL PREPARATION
Boston College Chemistry and Biology (dual major) B.S. 1977
Drexel University Environmental Sciences and Engineering M.S. 1981
Univ. of North Carolina at Chapel Hill Environmental Sciences and Engineering Ph.D. 1987

APPOINTMENTS
• Professor, Department of Civil and Environmental Engineering, Virginia Tech, 2005–present
• Adjunct Professor, Food, Science, and Technology, Virginia Tech, 2012–present
• Associate Professor, Department of Civil Engineering, Virginia Tech, 1995–2005
• Assistant Professor, Department of Civil Engineering, Virginia Tech, 1988–1994

PRODUCTS: Dr. Dietrich has published 136 products in the peer-reviewed literature.
FIVE MOST CLOSELY RELATED *= student researcher

5 OTHER SIGNIFICANT RELEVANT PRODUCTS


**SYNERGISTIC ACTIVITIES:**

1. **Education:** Teaching Excellence Award, from Civil and Environmental Engineering Alumni Association. Co-Director of Virginia Tech’s Water INTERface, an Interdisciplinary Graduate Education Program that integrates students and faculty in the departments of Civil and Environmental Engineering, Food Science and Technology, Human Nutrition, Food, and Exercise.

2. **Outreach:** **Public Schools:** Visit public school children to talk about various topics in science and engineering. Regular volunteer for Virginia Tech summer camp and recruitment events for 6-12 students. **Professional Outreach:** American Water Works Association: Member since 1979 and Chair of Taste and Odor Committee 2005-2008. Chair of International Water Association’s Specialty Group for Tastes, Odours, and Algal Toxins in Drinking Water Sources and Aquaculture, 2012-present.

3. **International Activities:** Co-Organizer or program Committee member of International Water Association’s Specialty Group for Tastes, Odours, and Algal Toxins in Drinking Water Resources and Aquaculture. Paris, France, 1998; Barcelona, Spain, 2002; Cornwall, Ontario, 2005; Korea, 2008; Scotland, 2011; Taiwan 2013; Sydney, Australia 2017.

4. **Professional Development:** Selected to receive Fellowships: 1) American Association for the Advancement of Science: Environmental Science & Engineering Fellow; 2) NASA Visiting Scientist Fellow; 3) AAAS Science, Technology and Policy Fellow.

5. **Invited presentations and keynote addresses:**
   - Dietrich, A.M. Occurence and detection of taste and odour compounds and algal toxins; 11th International Water Association Symposium on Tastes, Odours and Algal Toxins in Water: Occurrence and Control; 14th - 16th February 2017, Sydney, Australia. (Themed Speaker).
   - Dietrich, A.M. Chemistry and qualities of good tasting drinking water. The 10th IWA Symposium on Off-Flavours in the Aquatic Environment, October 27-November 01, 2013, National Cheng Kung University, Tainan, Taiwan. Keynote.
A. Professional Preparation
Bucknell University  Chemistry  B.S.  1975
Duke University  Organic Chemistry  Ph.D.  1979

B. Appointments
2007-present  Professor of Biomaterials, Virginia Tech
2008-present  Adjunct Professor of Chemistry, Virginia Tech
1979-2007  Positions including Technology Fellow; Technology Director - Eastman Drug Delivery Systems; Lab Head, Cellulose Esters Research Lab; R&D Scientist, Eastman Chemical Company

C. Publications
(i) Five publications most relevant to the proposed project

(ii) Five other significant publications

D. Synergistic activities
1. Associate Editor of journals Cellulose (2009-present) and Carbohydrate Polymers (2012-present).


4. Contributions to Professional Societies, ACS: CELL: Councilor 2008-present (overall have been ACS Councilor for 20 years); Program Chair, 2000-2002; Chair 2003-2004, Immediate Past Chair 2005-2006. ACS National Governance: Elected member, Nominations & Elections Committee, 2010-2012; Chair, National ACS Divisional Activities Committee (DAC), 2007-2009; Member, Board Committee on Planning, 2007-2009.

5. Gordon Conference on Chemistry of Polysaccharides: Conceived, wrote proposal which was approved by the Gordon Conferences. First conference was at Mt. Holyoke College, Massachusetts, July, 2001. This Gordon Conference was a unique concept where the meeting (every 2 years) rotated between sites in North America, Europe, and Asia, to serve the geographically diverse Polysaccharide Chemistry community.
Appendix I: Biosketches

John J. Jack Lesko
Associate Dean for Research & Graduate Studies, College of Engineering
Professor, Biomedical Engineering and Mechanics (formerly Engineering Science and Mechanics)
Virginia Polytechnic Institute and State University
Blacksburg, VA, 24061, jlesko@vt.edu

Professional Preparation
University of Maryland College Park, Maryland Mechanical Engineering B.S., 1987
Virginia Polytechnic Institute Blacksburg, Virginia Engineering Ph.D., 1994
and State University

APPOINTMENTS
Virginia Tech, Blacksburg, Virginia
Associate Dean for Research & Graduate Studies, College of Engineering, 2011 - Present
Professor, 2006 – Present,
Associate Professor, August 2000 - 2006
Assistant Professor, Engineering Science & Mechanics Department, August 1995 – 2000
Research Associate/Visiting Assistant Professor, Engineering Science & Mechanics Department, August 1994 – August 1995
Senior Graduate & Graduate Research Assistant, Engineering Science & Mechanics Department, January 1989 - August 1994

David Taylor Research Center, Carderock, Maryland
Structural Test Engineer, GS 11.2, June 1987 to August 1989

Publications
Five Publications Most Closely Related to Proposed Project:
5. A. Shaver, J. D. Moon, D. Savacool, W. Zhang, G. Narang, G. Miller, B. Vondrasek, J.J. Lesko, B. D. Freeman, J.S. Riffle, J. E. McGrath, “Poly(2,6-dimethyl-1,4-phenylene oxide) blends with a Poly(arylene ether ketone) for gas separation membranes,” Polymer, Available online 17 February 2017,
Appendix I: Biosketches

FIVE OTHER SIGNIFICANT PUBLICATIONS:


Synergistic Activities
- **Board Seats:** GEM National Consortium - Executive Committee, VP for University Strategy, August 2013 – Present. & the Commonwealth Center for Advanced Manufacturing – Board of Directors, August 2013 - Present, Appointed by Virginia Tech’s President’s Office.

- Collaborative development, installation and repair with FRP girders of the 40-foot-span Dickey Creek Bridge in Sugargrove, Virginia, September 2001 and rehabilitation utilizing an FRP bridge deck system Hawthorne Street Bridge, Covington, Virginia, November 2007.

- WEPAN Webinar on Self-Efficacy, Co-developed with Drs. Amelink & Beier (Rice University) and delivered by Women in Engineering ProActive Networks.

- NSF I-Corps Mid-Atlantic Regional Node, Served as Co-PI and trained national instructor for the National training program for NSF I-Corps Teams, operated in coordination with the University of Maryland, George Washington University, and Johns Hopkins University.

- **Co-Founder and Principal of PowerHub Systems,** PowerHub (formerly VPT Energy Systems) designs and manufactures distributed battery energy storage and power processing hardware for smart grid applications. PowerHub Systems was recently (February 2016) sold to an undisclosed utility facing company.
Appendix II: Tables and Figures

Figure 1: Materials SGA Overview

Figure 2: Sustainable Water through Innovations in Membranes & Materials - SWIMM
Table 1: Milestones and Deliverables

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Deliverable</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWIMM Workshop</td>
<td>Detailed report on current VT efforts and plans to interact with destination areas and other Materials SGA research pillars.</td>
<td>Summer 2017</td>
</tr>
<tr>
<td>New Faculty Hire</td>
<td>Faculty Search in the area of Advanced Manufacturing of Membranes resulting in a new faculty hire</td>
<td>Spring 2018</td>
</tr>
<tr>
<td>Pilot-Scale Facility</td>
<td>Planning and design for a combined membrane manufacturing and pilot-scale testing facility in collaboration with the new faculty hire.</td>
<td>Spring 2019</td>
</tr>
<tr>
<td>Center Proposal</td>
<td>Preparation and submission of a Center-level interdisciplinary proposal in Water Purification Membrane Materials</td>
<td>Fall 2020</td>
</tr>
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</table>

Figure 3: Research Team Contributions
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Department</th>
<th>College</th>
<th>Collaborations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klaus Moeltner</td>
<td>Agricultural &amp; Applied Economics</td>
<td>CALS</td>
<td>He</td>
</tr>
<tr>
<td>Brian Badgley</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
<td>Dietrich, He, Stewart, Xia</td>
</tr>
<tr>
<td>Kang Xia</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
<td>Steward, Badgley, Vikesland</td>
</tr>
<tr>
<td>Ryan Stewart</td>
<td>Crop &amp; Soil Environmental Sciences</td>
<td>CALS</td>
<td>Long, Morris, Dietrich, Badgley, Xia</td>
</tr>
<tr>
<td>Susan Duncan</td>
<td>Food Science and Technology</td>
<td>CALS</td>
<td>Dietrich, Long, Hedrick, He, Edwards, Riffle</td>
</tr>
<tr>
<td>Valisa Hedrick</td>
<td>Human Nutrition, Foods, and Exercise</td>
<td>CALS</td>
<td>Dietrich, He</td>
</tr>
<tr>
<td>Kevin Edgar</td>
<td>Sustainable Biomaterials</td>
<td>CNRE</td>
<td>Martin, Moore, Long, Riffle, Baird, Foster, Cheng</td>
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<tr>
<td>David Dillard</td>
<td>Biomedical Engineering &amp; Mechanics</td>
<td>COE</td>
<td>Baird, Long</td>
</tr>
<tr>
<td>Jack Lesko</td>
<td>Biomedical Engineering &amp; Mechanics</td>
<td>COE</td>
<td>Riffle, Long</td>
</tr>
<tr>
<td>Donald Baird</td>
<td>Chemical Engineering</td>
<td>COE</td>
<td>Long, Moore, Riffle (Chemistry); Foster (MSE); Edgar (SusBio); Dillard (BEAM); Martin (CHE) - MII</td>
</tr>
<tr>
<td>Luke Achenie</td>
<td>Chemical Engineering</td>
<td>COE</td>
<td>Deshmukh</td>
</tr>
<tr>
<td>Sanket Deshmukh</td>
<td>Chemical Engineering</td>
<td>COE</td>
<td>Martin, Morris</td>
</tr>
<tr>
<td>Stephen Martin</td>
<td>Chemical Engineering</td>
<td>COE</td>
<td>Baird, Deshmukh, (CHE); Moore (Chemistry); Foster (MSE); Edgar (SusBio) - MII</td>
</tr>
<tr>
<td>Andrea Dietrich</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
<td>Badgley, Duncan, Gohlke, He, Hedrick, Lesko, Martin, Morris, Stewart</td>
</tr>
<tr>
<td>Jason He</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
<td>Morris, Badgley, Long, Dietrich, Moeltner</td>
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<td>Marc Edwards</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
<td>Vikesland, Duncan</td>
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<td>Peter Vikesland</td>
<td>Civil &amp; Environmental Engineering</td>
<td>COE</td>
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<td>Johan Foster</td>
<td>Materials Science &amp; Engineering</td>
<td>COE</td>
<td>Martin, Bair - MII</td>
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<td>Amanda Morris</td>
<td>Chemistry</td>
<td>COS</td>
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<tr>
<td>Judy Riffle</td>
<td>Chemistry</td>
<td>COS</td>
<td>Baird, Long, Moore, Lesko</td>
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<td>Robert Moore</td>
<td>Chemistry</td>
<td>COS</td>
<td>Martin, Long, Baird, Riffle</td>
</tr>
<tr>
<td>Tim Long</td>
<td>Chemistry</td>
<td>COS</td>
<td>Moore (Chemistry)- MII</td>
</tr>
<tr>
<td>Shengfeng Cheng</td>
<td>Physics</td>
<td>COS</td>
<td>MII</td>
</tr>
<tr>
<td>Julia M. Gohlke</td>
<td>Population Health Sciences</td>
<td>Vet Med</td>
<td>Dietrich</td>
</tr>
</tbody>
</table>
Appendix III: Provisional Job Ad

Tenure Track Faculty Position
Global Systems Science Destination Area
Virginia Tech

The Global Systems Science (GSS) Destination Area at Virginia Tech seeks outstanding candidates for a tenure-track faculty opening at the rank of Associate or Full Professor. The Sustainable Water through Innovation in Membranes & Materials program (SWIMM) is an interdisciplinary research effort aimed at improving access to clean water through the development of novel materials and devices for water treatment and purification. The successful candidate should have significant experience and national recognition in the areas of advanced manufacturing and fabrication of membranes, as well as the scale-up of membrane devices and systems. The candidate is expected to take a lead role in the creation of a new membrane processing and scale-up facility on campus, and will serve as a key point of contact between other SWIMM and GSS faculty, industrial partners, and government sponsors. Applicants should have a Ph.D. in Chemical Engineering, Materials Science, or a related field, a record of excellence in research, and a commitment to teaching and working with a diverse population of undergraduate and graduate students.