

# Angela D. Lueking, Ph.D.

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Dear Members of the Search Committee:

## Part I: Qualifications

I am writing to apply for the position of President, South Dakota Mines (SDM). I currently serve as Vice Chancellor of Research and Dean of the Graduate School at Montana Tech. In my three years at Tech, I have installed centers and new positions, hired, elevated, and enabled staff, revamped processes and policies, and built partnerships that have all contributed to significant growth in the institution.<sup>1</sup> Most recently, I am leading a University-wide [workforce initiative](#) that will reinvigorate legacy departments, inject externally-funded resources, and elevate standards for educational delivery and student services, all while leveraging institutional history and community pride, such that the project will address critical national needs to strengthen a future mineral/materials workforce.

As Associate Dean for Research at Missouri S&T, I worked with University leadership to facilitate campus-wide initiatives related to [manufacturing](#),<sup>2</sup> [energy](#), [critical minerals](#), and [broadening faculty participation](#)<sup>3</sup> At the college-level, I made data-driven strategic decisions to invest in college centers, midcareer professional development, and mentoring programs for junior faculty. As a result, research expenditures rose significantly, college rankings increased, and the college marked the highest number of NSF CAREER awards in its history.<sup>4</sup> To this day, I receive accolades about how my mentorship set faculty on a new career trajectory.

As a rotating program director at the National Science Foundation, I collaboratively set national research priorities for the [field](#) and the [discipline](#), while making funding decisions that impacted the fields of chemical, mechanical, and environmental engineering, chemistry, and physics. I rose through the academic ranks in Energy & Mineral Engineering at Pennsylvania State University, where I led interdisciplinary, multi-investigator research projects in the hydrogen/materials space that spanned colleges, engaged other Universities and national labs, and spurred collaborations across the globe. I was selected as one of 25 American scientists for a Marie Curie International Incoming Fellowship in 2012. I hold three graduate degrees from the University of Michigan, and as a Nebraska native, my undergraduate chemical engineering degree is from the University of Nebraska-Lincoln.

Reflecting upon my journey, I have over 20 years of progressive academic leadership experience across four very diverse organizations. My academic experience is all at a ‘school of mines’<sup>5</sup>, and I’ve seen highs and lows in this culture—from mergers to evolution to embrace. I ascended the faculty ranks at a research powerhouse, and yet, I was very drawn to the opportunity to create a research culture at a primarily undergraduate institution (PUI). My own research was very high-risk (the ‘Grand Challenge’ of its day), and now, I invest in applied research, including creation of a technology translation office and student entrepreneurship programs. I have evolved from leading a team, to leading a program, to leading

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<sup>1</sup> From FY22 to FY24, external research doubled (from \$9.1 to \$18.4 M), graduate total enrollment increased by 12%, graduate applications increased by 40%, and graduate tuition revenue increased by 8%. The new workforce initiative discussed is projected to increase enrollment by an additional 12%.

<sup>2</sup> An NSF ERC planning grant, along with the an industrial consortium, were co-presented to the state legislature, and this ultimately led to [a \\$50 million designation in the Missouri state budget](#)

<sup>3</sup> I was PI on the prior [ADVANCE](#) submission, then helped to coordinate resubmission up to one month before my departure. The resubmission led to a successful award, although I was not a named investigator on the award.

<sup>4</sup> Per tenure track research expenditures per tenure track faculty rose from \$140K in FY17 to \$213K in FY20; The college U.S. News ranking rose 23 spots, from 106 when I arrived, to 83 when I left.

<sup>5</sup> College of Earth & Mineral Sciences at Penn State, Missouri S&T was once ‘Missouri School of Mines’, and Montana Tech was founded as the ‘Montana School of Mines’ to supply mining and electrical engineers to active copper mines.

people, and then, acting as a cultural change agent while striving to stay true to institutional history and community values.

Reflecting further upon my leadership style, I can distill my leadership values into the following attributes: (1) A leader sets a vision, that is both aspirational and responsive to stakeholders and changing conditions, (2) A leader enables, inspires, and serves her team, creates meaningful performance metrics, and checks in regularly for updates on progress toward these metrics, (3) A leader creates a culture of trust, respect, and full participation, and serves as a role model in these attributes; (4) A leader is a rainmaker to create and expand opportunities for her constituents.

## **Part II: A Proposed Vision for 2050 and beyond**

Since planning for a jointly sponsored workshop in Fall 2022, I have met regularly with SDM colleagues to discuss joint projects and collaboration opportunities, with a focus on national security drivers to create a domestic mineral/materials supply chain. This culminated in a visit to the SDM campus in November 2023, in which I participated in both strategic discussions and campus tours. I also joined my SDM counterpart in Seattle to jointly explore collaboration with the Navy and Pacific Northwest National Lab. In September 2024, I met with Kayla Bastian to discuss opportunities on the horizon for this position. All of these conversations inform the preliminary vision and goals for my SDM presidency, discussed below.

As President of South Dakota Mines, I propose a 2050 vision that will:

- Engage the SDM community in a culture of innovation, opportunity, and entrepreneurship to equip graduates for a rapidly evolving technological future;
- Recruit and retain students by leveraging innovative facilities and programing, and exploring collaborative inter-campus partnerships;
- Ensure affordability and access while maintaining excellence;
- Articulate SDM's value proposition to build and expand partnerships for economic growth.

I recognize that iteration on the above is needed with the community; nevertheless, rationale for the vision and implementation strategies are discussed in the next section.

## **Part III: Implementation of the Proposed 2050 Vision**

***Innovation, Opportunity, and Entrepreneurship:*** As we look toward the impact artificial intelligence will have on technology and society, we must challenge our STEM students to embrace discovery, entrepreneurship, reproducibility, scalability, and translation. It is this combination of skills that will enable SDM graduates to solve the “wicked Moonshot problems” for which no known solution exists. To me, this is at the heart of an educational vision for 2050, and for this reason, I fully embrace that both research and hands-on learning are critical enablers to realize this vision. Opportunities and partnerships in the ‘***Minerals, manufacturing, and workforce***’ space abound, and as a ‘school of mines’, SDM is uniquely positioned to capture them. A national transition to a materials-intensive decarbonized economy, along with efforts to secure the domestic supply chain, uniquely position SDM to leverage its legacy, engage faculty, and differentiate the student experience to expand its recruitment pipelines, both domestically and abroad.

Positioning the University to compete for resources in this space must start with institutional reward structures, followed closely by strategic hires. I understand from my discussion with Kayla Bastian that the former are largely in place. For the latter, I would explore thematic hires. In my current role, I have invested in college centers, seed funds, and a technical director for technology transfer to coalesce faculty efforts and maximize University investments. On a programmatic level, I have decentralized graduate

program funds to enable chairs to adapt individualized growth strategies. To interject shared governance, I have engaged faculty and students in decision-making bodies: shifting council/committee/board leadership to faculty, and creating a graduate student-led advisory board. For both, I provided staffing support, and then listened to (and subsequently funded) barriers to success that were identified by stakeholders. A critical strategy was to minimize barriers and maximize efficiencies, as in my experience, faculty time is one of the most undervalued resources on a college campus. My current organization is lean, and I coach my staff strive to “work smarter, not harder” while providing a customer service minded culture, as faculty ultimately drive our results. We have inserted clarity and transparency into procedures and policies, increased clarity and metrics into our communication, streamlined processes, and implemented scorecards to track progress toward results.

***Recruitment and Retention: Engaging the full STEM pipeline:*** The ‘Why’ engages and inspires<sup>6</sup>, yet a college education generally focuses on the ‘what’ and the ‘how’, thereby deemphasizing the ‘why’. Most STEM alumni will describe the first ‘spark’ that set them on their STEM career as some sort of “beyond the textbook” learning activity. Following from this, experiential learning is at the heart of many high-impact educational practices.<sup>7</sup> For example, in the first-year, engagement, design, and project-based learning provide the “Why” that will sustain students through rigorous fundamental courses. Similarly, the “Why” embedded within undergraduate research, senior design, and graduate theses provide the key demarcation of career readiness. Faculty scholarship differentiates a University, while becoming a magnet for the best and brightest students from across the nation and abroad. External funding for this scholarship ensures it has value to constituents. At SDM, I see new facilities (e.g. the Minerals Industries Building and the Devereaux Library) as innovation laboratories that can be further leveraged for recruitment and retention, to move towards a differentiated 2050 vision for STEM education. In my first month, I would frame conversations with constituents to better understand how SDM engages faculty and students in their ‘why’ across activities and discuss further opportunities to do so.

The 2050 STEM University must be ever more cognizant of the gaps in STEM preparedness of first-year college students. These gaps are often exacerbated in students from rural schools that are increasingly relying on teachers without specialized STEM education. Unless this preparedness gap is addressed, it may easily emerge as an existential challenge for Midwestern STEM-focused institutions. Programming abounds at many institutions, including for example, summer camps, technology days, research experiences for teachers, mobile outreach programs using virtual reality, and alumni sponsorship for these efforts. In my first six weeks, I would work to better understand and support current initiatives at SDM. I would also be highly enthusiastic to explore how SDM STEM foundational courses may be used to complement other educational programs across the state to tackle the problem of STEM preparedness within rural schools. A similar strategy, implemented successfully at Missouri S&T, aligned the STEM core with teacher certification needs for the state, and reaped additional campus benefits including more robust educational training for all faculty, enhanced funding opportunities, outreach opportunities, and an on-campus childcare center. This is a much more complex proposal that it seems on the surface, as it involves understanding alignment with state teaching standards and K-12 incentive structures for teachers, along with a review of existing offerings. An added benefit is that this strategy would add an additional strategy for an on-campus off-ramp for students that exit STEM for another degree.

I am deeply committed to broadening faculty participation from underrepresented groups, as these faculty serve as role models and aid in recruitment and retention. Past evidence of my commitment includes creation of a NSF program to re-engage midcareer faculty<sup>8</sup> and an ADVANCE initiative at S&T.<sup>3</sup>

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<sup>6</sup> Sinek, Simon. *Start with Why: How Great Leaders Inspire Everyone to Take Action*, Penguin Publishing, 2009.

<sup>7</sup> <https://www.aacu.org/trending-topics/high-impact>

<sup>8</sup> NSF’s Re-entry to Active Research (RARE) [initiative](#)

***Affordability/Access with Excellence:*** I am deeply committed to promote SDM's special focus as a STEM-institution, while maintaining affordability and access without compromising excellence. As a small-town girl from rural Nebraska, affordability, access, and scholarships/waivers drove my college decision. A campus visit convinced me that this decision would not compromise excellence, as honor students described working alongside faculty, and a handshake from the new President sealed the deal. Maintaining affordability without compromise requires both prudent ***fiscal management***, as well as the creation of ***new revenue streams***. I became well versed in prudent fiscal management at NSF, where I managed a \$35M federal program through a presidential transition, government shutdowns, and considerable uncertainty introduced by the removal of deadlines for proposal submission. At Missouri S&T, with a very limited budget, I developed a sharp focus in designing initiatives, such that every dollar led to a return on investment, every seed fund led to a proposal, every program enabled a faculty, and every initiative was an entrepreneurial venture. The equation changed to one of revenue creation at Montana Tech, where surplus research-derived revenue<sup>9</sup> enabled University-wide strategic initiatives, an increased return to campus, investment in the library, faculty seeds funds, graduate fellowships, and a more robust graduate recruitment strategy.

***The SDM Value Proposition:*** In my current role, understanding the differentiated value proposition of the University has been the key to revenue growth<sup>1</sup>. Enabling my team to manage day-to-day operations allowed me to shift my focus to partnership building to grow opportunities. An essential component to the latter was understanding how our University value proposition aligned with the needs of each potential partner. In the past year, I have increased partnerships with the [Navy](#), the regional [Headwaters Tech Hub](#), and a transformative DoD-funded [workforce initiative](#). Similarly, the SDM value propositions, from my current perspective, are in the '***Minerals, manufacturing, and workforce***' space, as well as the '***Future STEM workforce***' space. While comprehensive Universities focus on student amenities, these value propositions focus on leveraging the SDM heritage, while enabling regional economic development and the future workforce. As the needs for a highly trained STEM workforce are critical, and are anticipated to grow, there will be increasing opportunities to position industry (and government) employers on STEM campuses so that they may participate in the education process and position themselves to compete for the best talent. It is access to quality students that will drive partnerships, even in a somewhat remote location. Student design centers, on-site internships, secured industrial co-location facilities,<sup>10</sup> incubators, consortium, and alumni sponsorships all provide opportunities for employers to preview their new hires.

What an exciting time to be at SDM! I would welcome the opportunity to further iterate on a 2050 STEM-focused Vision for SDM through discussions with the search committee.

Sincerely,



**Angela D. Lueking, Ph.D**

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<sup>9</sup> As Montana Tech research expenditures doubled during in tenure, indirect return (F&A) rose from \$1.4M to over \$2.5M (4.6% to 8.3% relative to the general revenue budget), providing a positive return to the campus budget and enabling the multiple initiatives listed.

<sup>10</sup> This was a key tenet of Missouri S&T's [Kummer Institute](#), for which I was tapped by Chancellor Mo Dehghani to collaborate on several early-stage concepts.

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### LEADERSHIP EXPERIENCE

#### Vice Chancellor for Research / Chief Research Officer

Montana Technological University

Butte, MT, 2021-present

- Oversight of research expenditures, research policy, research centers, technology transfer, sponsored programs, research integrity, and graduate school
- Strategic investment of \$2.5 million discretionary funds to promote campus priorities and initiatives
- Relationship building to grow directed defense funding (+43%) and expenditures ([\\$9.1-\\$18.4M](#); FY22-24)
- Strategic matchmaking led to University's first Cooperative Research & Development Agreement
- Investment in new positions to expand research footprint, including Directors of Technology Transfer, Graduate Enrollment, Center of Environmental Remediation, and Emerging Graduate Initiatives

#### Dean of the Graduate School (joint role)

- Conceived, secured funding, and managed initiation of new on-line graduate initiative for adult learners (projected 12% revenue increase)
- Data-driven system-based expansion to increase graduate total enrollment (+12%) and recruitment (+40%)
- Revised out-of-state recruitment strategies for additional \$450 K (+9%) in tuition revenue
- Shifted Graduate Council to shared governance model, adopted new BS+MS program, and for NWCCU accreditation, revised program education objectives and student learning outcomes.
- Initiated Graduate School's first rubric to assess student outcomes.
- Streamlined processes to serve students, increase staff efficiencies, and increase stakeholder participation

#### Associate Dean for Research, College of Engineering & Computing

Missouri Univ. Sci. & Tech. (S&T)

Rolla, MO, 2018-2021

- Spearheaded new research initiatives, leading to a 27% increase in external research expenditures in three years [\$177 to \$242 K/TTT (FY18 to FY20); ~\$25M total]
- Overhauled research reporting to foster increase in U.S. News rankings by 23 spots (106 to 83).
- Developed junior faculty mentoring programs, leading to the highest [CAREER](#) awardees in University history
- Spearheaded interdisciplinary public-private partnerships in manufacturing ([\\$50M Protoplex](#); ERC [Planning Grant](#)), NSF-[sponsored](#) critical minerals workshop, nuclear energy, and diversity (NSF [ADVANCE](#))
- Built external partnerships, including two Dept. of Defense Educational Partnerships Agreements
- Spanned boundaries to integrate education, team science, and diversity/inclusion into institutional proposals
- Collaborated to establish research themes of the [Kummer Institute](#) (KI), co-chaired faculty task force, spearheaded entrepreneurial fellowships, and presented progress to KI Board of Directors
- Secured post-doctoral [fellowship](#) and wrote technical proposal for department [naming gifts](#)

#### Program Director, Molecular/Process Separations

National Science Foundation

Alexandria, VA, 2016-2018

- Managed \$35M total research portfolio, including selection of advisory review panels, award recommendation, realignment of program priorities with disciplinary needs
- Initiated two ~\$1M National Academies studies that influenced the [field](#) and [chemical engineering discipline](#)
- Piloted 'no deadline' program within division for increased outcomes (4-fold increase in success rate) and streamlined processing (decreased administrative paperwork by ~60%)
- Travelled as an international NSF agent to secure scientific collaborations in sustainability-related topics
- Mentored Principal Investigators on grantsmanship, impact, and integration
- Conceptualized [initiative](#) to reactivate midcareer faculty, lobbied to designate \$1.2 million in funding
- Fostered extended relationship as an *Expert* (2019) and faculty mentoring volunteer (2019-2023)

## ACADEMIC EXPERIENCE [See also Academic CV, page 3]

### Professor (Assistant, Associate, Full) of Energy & Mineral Engineering; Joint Appointment in Chemical Engineering

Pennsylvania State University  
University Park, PA, 2003-2018

- Taught core engineering undergraduate and graduate courses, upper-level electives, lower-level general education courses in a student-centric environment, typically 2:3 load
- Led multidisciplinary research teams related to hydrogen storage and spillover, development of porous and catalytic materials, advanced *in situ* materials characterizations, and *ab initio* calculations with faculty teams from diverse backgrounds (chemical engineering, physics, chemistry, material science, fuel science)
- Leveraged a \$338K startup to secure \$6.9M of competitive research and education funding in twelve years with grants from the Department of Energy, National Science Foundation, and American Chemical Society
- Built and programmed an automated high-pressure, differential gas adsorption apparatus and quantified process improvement via extensive systems analysis
- Advised and mentored undergraduate (8), Masters (3), PhD (4), and post-doctoral researchers (6)
- Published peer-reviewed research articles (44), patents (2), book chapters (3), invited international (5) and domestic (26) presentations, technical reports (10), educational articles (5) and a *Energy & Environment* (562 pp) textbook. Work included cross-institutional, multi-national collaborations and student recognitions.
- Served various elected University (e.g. Research Protections, K-12 Outreach, University Graduate Council), College, Departmental committees, and peer-review of grants and journal articles
- Recognized for Research Excellence (Earth & Mineral Sciences Energy Institute, 2008), Research Initiation (Wilson, 2005; Deike Award, 2009) and Service (Commission for Adult Learners, 2014)

### Senior Incoming Marie Curie Fellow, European Union

University of Crete

- Selected as 1 of 25 American scientists (all disciplines/demographics) Heraklion, Greece, 2012-2013
- Competitively awarded fellowship, and published results, that reconciled dispute between experimental observations (adsorption and *in situ* characterization) vs. *ab initio* predictions of hydrogen spillover

## INDUSTRY EXPERIENCE

### Environmental Engineer, Paper Products Manufacturing Facility

Procter & Gamble

- Participated in extensive corporate leadership training program Albany, GA, 1998-1999
- Process improvement for chemical management and environmental permitting in manufacturing setting
- Delivered and updated chemical, safety, and environmental training

## EDUCATION

PhD, Chemical Engineering, University of Michigan, August 2003

MSE, Chemical Engineering, University of Michigan, May 1998

MSE, Environmental Engineering, University of Michigan, May 1998

BS, Chemical Engineering, *Distinction*, University of Nebraska, May 1996

Certificates: *Systems Thinking*, MIT XPro, 2021; *Leadership*, Harvard Business School Online, 2019

## HONORS, AWARDS, AND SERVICE

- Committee of Visitors, *Chem.Bio.Env.Transport* Division, NSF, 2024
- Executive Committee, [Critical Resource Summit](#), with National Security Innovation Network, 2023
- Advisory board member, various [Butte Local Development Committee, [Graduate student mental health \(Montana Univ. System\)](#); [Univ. Chicago advanced bio-manufacturing](#)], 2021-present (dates vary)
- Board of Directors (elected), Engineering Research Council, *Amer. Soc. Engin. Educ.*, 2020-2021
- Founding Co-Chair, [Faculty Advisory Committee](#), [Kummer Institute](#), Missouri S&T, 2020-2021
- Campus liaison and lead, [Ameren Accelerator](#), University Missouri, 2019-2020.
- Treasurer (elected), Women in Engineering Division, *Amer. Soc. Engin. Educ.*, 2019-2021
- Mentor, [Community College Innovation Challenge](#), NSF Education & Human Resources, 2017



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## ACADEMIC CURRICULUM VITAE

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### COURSES TAUGHT AT THE PENNSYLVANIA STATE UNIVERSITY

#### *Core Undergraduate Engineering Courses*

- ChE 100S: Introduction to Chemical Engineering (Freshman Seminar)
- ChE 220: Thermodynamics
- EME 301: Thermodynamics (Energy Engineering, Petroleum Engineering, Environmental Systems)
- EGEE 304: Heat and Mass Transfer (Energy Engineering)
- ChE 410: Mass Transfer Operations (Chemical Engineering)
- EME 464/FSc 464: Senior Design for Energy Engineers / Fuel Plant Design
- GeoEE 427: Pollution Control in the Processing Industry (Water Treatment; Environmental Systems)
- GeoEE 480: Senior Design for Environmental-Systems Engineers

#### *Graduate-Level Engineering Courses*

- EGEE 510: Engineering Chemistry for Energy Engineers
- EGEE 580: Integrative Design

#### *Electives (Graduate/Undergraduate Level)*

- EME 412: Green Engineering and Environmental Compliance
- EGEE 410: Hydrogen and Fuel Cell Technology

#### *General Education*

- EGEE 101: Energy and the Environment

### GRADUATE EDUCATION AND SUPERVISION OF STUDENT RESEARCH (AT PENN STATE)

#### *Supervision of Undergraduate Research*

- Drew Belnick, Chemical Engineering Undergraduate, August 2015-May 2016
- Shaun Gannon, Chemical Engineering Undergraduate, August 2014-May 2015
- Christopher Malencia, Chemical Engineering Undergraduate, August 2013-August 2014
- Ed Schreiner, Chemical Engineering Student, January 2012-May 2012
- Clinton Moyer III, Chemical Engineering Undergraduate, September 2011-December 2011
- Kevin Bancroft, Chemistry Undergraduate, May 2007-May 2008; Fall 2008- August 2009
- Nikola Grozdanic, International Association for the Exchange of Students for Technical Experience (IAESTE) United States Internship Program (July 2006-December 2006).
- Sabil Huda, National Nanofabrication Infrastructure Network (NNIN) Research Experiences for Undergraduates (Summer 2005)

#### *Graduate Dissertations Supervised*

Paramita Ray, PhD Student, Chemistry, (Undergraduate Degree: Chemistry), Interactions of Nitrogen and Hydrogen with Various 1D and 3D Carbon Materials Probed via In-Situ Vibrational Spectroscopy, 2011-2016. Current: Process Engineer, Intel.

Cheng-Yu Wang, PhD, Energy & Mineral Engineering, Minor in Chemical Engineering, (Undergraduate Degree: Chemical Engineering; MS Degree: Materials Science), Hydrogen Storage in Zinc and Copper Types of Metal-Organic Frameworks via Hydrogen Spillover, 2014. Current: Assistant Professor, Department of Materials Science and Engineering, National Chiao Tung University, Taiwan

Sarmishtha Sircar, PhD, Energy & Mineral Engineering, (Undergraduate Degree: Mining Engineering), Studies of Adsorption in Gate-Opening Metal Organic Frameworks, 2013. Current: Process Ramp Engineer, Intel Corporation.

Qixiu Li, PhD, Energy & Geo-Environmental Engineering, (Undergraduate Degree: Chemical Engineering), Effect of Surface Chemistry on Hydrogen Spillover in Carbon Supported Catalysts, 2012. Current: Director of Chancellor's Office, Duke Kunshan University, China.

Apurba Sakti. MS, Energy & Geo-Environmental Engineering (Undergraduate Degree: Mining Engineering), "Study of Structural Transformations and Hydrogen Evolution from a Ball-Milled Anthracite Coal," 2008. Current: Research Scientist, MIT Energy Initiative.

Puja Jain. MS, Fuel Science (Undergraduate Degree: Chemical Engineering), "Catalyzed Nanocarbons for Hydrogen Storage: Experimental and Theoretical Study of the Spillover Phenomenon," 2006. Current: Associate Partner, McKinsey & Company.

Deepa Narayanan. MS, Fuel Science (Undergraduate Degree: Electrical Engineering), "Exploratory Study of Exfoliated Graphite Nanofibers and Milled Anthracite-Metal Composites for Hydrogen Storage", 2006. Current: Sr. Energy Management Engineer, Puget Sound Energy.

#### *Advisees for Post-Doctoral Research*

Dr. Cheng Yu Wang, DOE-BES Caged Carbon Project (Lueking, PI), August 2014-August 2015. Current: Assistant Professor, Department of Materials Science and Engineering, National Chiao Tung University, Taiwan

Dr. Dania Alvarez Fonseca, DOE Nanoporous Carbon proposal, (Lueking, PI), August 2005-May 2007. Current: Research Scientist, University of Kentucky.

Dr. Kofi Adu, ACS-PRF and Deike Award, (Lueking, PI), March 2007-August 2007. Current: Associate Professor, Penn State Altoona.

Dr. Sami Ullah-Rather, DOE-EERE Spillover Project (Lueking, PI), June 2009-July 2010. Current: Assistant Professor, Department of Chemical and Materials Engineering, King Abdulaziz University, Saudi Arabia.

Dr. Xiaoming Liu, DOE-BES Caged Carbon Project (Lueking, PI), October 2009-February 2012. Current: Patent Examiner at U.S. Patent and Trademark Office.

Dr. Gregory Larsen, DOE-BES Caged Carbon Project (Lueking, PI), October 2011-December 2012. Current: Product Engineer, Schneller LLC.



## PUBLICATIONS AND SELECT PRESENTATIONS

Notation: 1: First author supervised by Lueking, 2: Student co-author; 3: Supervising author / Principal Investigator; 4: Contributing co-author; 5: International contributor.

### Textbooks

Cole, M.W., **Lueking, A.D.**, Goodstein, D. (2018) "Science of the Earth, Climate and Energy", An Introductory Textbook for General Education, World Scientific, 562 pages.

### Articles / Presentations Related to Education

Zappe, S.; Marshall, M.; Gomez, E.D.; Gomez, E.; **Lueking, A.D.** "Using Student Ambassadors to Relay Themes from *Changing the Conversation* in Engineering First Year Seminars." (Peer Reviewed), 119<sup>th</sup> ASEE Annual Conference and Exposition, San Antonio, TX, June 10-13, 2012.

Chapman, E.,<sup>2</sup> **Lueking, A.**, Tallon, R., Avery, L., Henning, P., Carlsen, W., Haworth, D., "Penn State University NSF GK-12 Project: Using Web-based Education and Interaction with K-12 and College Freshman to Promote Science and Engineering." (Paper No. 2005-2051), American Society of Engineering Education Annual Meeting, June 12-15, 2005, Portland, OR (Refereed publication).

Presented also at EMS FALL 2006 GEMS and 2006 PSU Graduate Research Symposium by E. Chapman.

**Lueking, A.D.** "Accelerating Graduate Research Education through on-line course management tools". ANGEL Day II: A Symposium of Faculty Examples, The Pennsylvania State University, May 18, 2004.

**Lueking, A.D.**; Ross, D.A.; Weber, W.J., Jr. "Environmental Sustainability Education at the University of Michigan: Collaboration with Industry to Provide Experiential Learning Opportunities". 2003 ASEE Annual Conference, Nashville, TN, June 22-25, 2003; Environmental Engineering Division.

**Lueking, A.D.**; Ross, D.A.; Weber, W.J., Jr. "*ConsEnSus*: An Engineering Educational Initiative in Environmental Sustainability at the University of Michigan". 6th Annual Green Chemistry and Engineering Conference, American Chemical Society, Washington, DC, June 24-27, 2002.

### Research Articles Published in Refereed Journals

Wang, C.-Y.,<sup>5</sup> Chang, C. -W.,<sup>5</sup> Wu, Y.J.,<sup>5</sup> **Lueking, A.D.** (2018). Observation and Simulation of Hydrogen Storage via Spillover. *Current Opinion in Chemical Engineering 2018 Hydrogen Issue* (Invited Review Article; Vasilios Manousiouthakis, Editor), 21: 116-121. <https://doi.org/10.1016/j.coche.2018.10.005>

Ray, P.,<sup>1</sup> Wang, C.-Y.,<sup>1</sup> Gidley, D., Badding, J.V., **Lueking, A.D.**<sup>3</sup> (2018). Understanding the interaction of Nitrogen with Polymer of Intrinsic microporosity (PIM-1) by vibrational spectroscopy. *Microporous and Mesoporous Materials*, 277: 29-35. DOI: [10.1016/j.micromeso.2018.09.01](https://doi.org/10.1016/j.micromeso.2018.09.01).

Ray, P.,<sup>1</sup> Xu, E., Crespi, V.H., Badding, J.V., **Lueking, A.D.**<sup>3</sup> (2018). In-situ vibrational spectroscopy of adsorbed nitrogen in porous carbon materials. *Physical Chemistry Chemical Physics*, 20, 15411-15418. DOI: [10.1039/C8CP01790E](https://doi.org/10.1039/C8CP01790E).

**Lueking, A.D.,** Cole, M. (2017). Energy and Mass Balances Related to Climate Change and Remediation. *Science of the Total Environment*, 590-591: 416-429. DOI: 10.1016/j.scitotenv.2016.12.101

Wang, C.-Y.,<sup>1</sup> Wang, H., Li, J., **Lueking, A.D.**<sup>3</sup> (2017). Oxygen-Selective Adsorption in RPM3-Zn Metal Organic Framework. *Chemical Engineering Science*, 165: 122-130. <https://doi.org/10.1016/j.ces.2017.02.020>

Ray, P.<sup>1</sup> Gray, J.L., Badding, J.V., **Lueking, A.D.**<sup>3</sup> (2016). High Pressure Reactivity of Triptycene probed by Raman Spectroscopy. *Journal of Physical Chemistry B*, 120 (42): 11035-42. DOI: (10.1021/acs.jpcc.6b05120)

**Lueking, A.D.**<sup>3</sup>, Wang, C.Y.,<sup>1</sup> Sircar, S.,<sup>1</sup> Malencia, C.,<sup>2</sup> Wang, H., Li, J. (2015). A Generalized Adsorption-Phase Transition Model to Describe Adsorption Rates in Flexible RPM3-Zn. *Dalton Transactions*, 45: 4242-57. DOI: 10.1039/c5dt03432a

Wang, C.Y.,<sup>1</sup> Ray, P.,<sup>1</sup> Gong, Q., Zhao, Y., Li, J., **Lueking, A.D.**<sup>3</sup> (2015). CO Adsorption to Two Cu Paddle Wheel MOFs Probed with in situ FTIR Spectroscopy. *Physical Chemistry Chemical Physics*, 40: 26766-76. DOI: 10.1039/c5cp04474j

Sircar, S.,<sup>1</sup> Pramanik, S., Li, J., Cole, M., **Lueking, A.D.**<sup>3</sup> (2015). Corresponding States Interpretation of Adsorption in Gate-Opening Metal-Organic Framework Cu(dhbc)2(4,4'-bpy). *J. Colloid Interface Science*, 446: 177-184. DOI: 10.1016/j.jcis.2015.01.011

Wang, C.Y.,<sup>1</sup> Gray, J., Gong, Q., Zhao, Y., Li, J., Klontzas, E.,<sup>5</sup> Psfogiannakis, G.,<sup>5</sup> Froudakis, G.,<sup>5</sup> **Lueking, A. D.**<sup>3</sup> (2014), Hydrogen Storage with Spectroscopic Identification of Chemisorption Sites in Cu-TDPAT via Spillover from a Pt/activated carbon catalyst. *J. Phys. Chem. C*, 118(46): 26750-26763. DOI: 10.1021/jp507395p

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--Note: This paper was not the same as #7, despite the identical titles, which reflects an oversight and significant delay in publication of the earlier paper.

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#### **Parts of Books**

**Lueking, A.D.**,<sup>3</sup> Jain, P.<sup>1</sup> (2009). Hydrogen Storage and Hydrogen Spillover in Carbon-Metal Nanomaterials. In *Nanomaterials for Energy Storage Applications* (Ed. H. S. Nalwa), pp. 214-257. American Scientific Publishers, Stevenson Ranch, CA, USA.

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Clark, S.B., Bryce, A.L., **Lueking, A.D.**, Gariboldi, J.; and Serkiz, S.M. (1998). Factors Affecting Trivalent f-element Adsorption to an Acidic Sandy Soil. In *Adsorption of Metals by Geomedia* (E. A. Jenne, Ed.), pp. 149-14. Academic Press, San Diego.

#### **Patents**

**Lueking, A.D.**, Narayanan, D. "Synthesis of Hydrogenated Carbon and Corresponding Decomposition into Hydrogen and Nanocrystalline Diamond at Moderate Temperatures and Pressures" *U.S. Patent #7,901,661*. Issued March 8, 2011.

**Lueking, A.D.**, Gutierrez, H. R., Fonseca, D. A., Narayanan, D., Jain, P., Burgess-Clifford, C.E. "Lower Pressure Synthesis of Diamond Material" *U.S. Patent #7,754,179*. Issued July 13, 2010.

#### **Conference Presentations Selected for Honors (Speaker's name in italics)**

*Sakti, A., Clifford, C.E.B., Lueking, A.D.* "Hydrogen Production from and Subsequent Trapping in Ball Milled Anthracite Coal" *Pittsburgh Coal Conference*, September 27, 2006.  
--Selected for Award: *Honorable Mention, Technical Poster*

*Lueking, A.D.*, Gutierrez, H.R., Fonseca, D.A. "Decomposition of hydrogen-modified coal-based structure into hydrogen and nanocrystalline diamond at moderate temperatures and pressures" *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 51 (1), 2006.  
--Selected for *Science Mixer (An inter-disciplinary session where highlighted research is presented in posters to a general audience and the media.)*

#### **Invited International Presentations (Speaker's name in italics)**

*Lueking, A.D.*, "Process Separations at the U.S. National Science Foundation." 9<sup>th</sup> Sino-US Joint Conference of Chemical Engineering, Separation Technology Symposium, Beijing, China, October 7, 2017. (Invited plenary)

*Lueking, A.D.*, Wang, C.Y., Li, J. "Exploration of Flexible Metal Organic Frameworks for Kinetic Separations." Flexibility and Disorder in Metal-organic Frameworks (MOFs) and other Porous Materials. CECAM (Centre Européen de Calcul Atomique et Moléculaire), Chimie ParisTech, Paris, France (June 3-5, 2015). (Poster presenter)

***Lueking, A.D.*** “Hydrogen Storage via Spillover through a Combined Experimental and Modeling Approach.” Marie Curie Seminar, University of Crete, Heraklion, Greece (April 4, 2013). (Invited speaker)

***Lueking, A.D.***, Pan, L., Narayanan, D., Clifford, C., Huda, S., Gutierrez, H. "Exfoliated Graphite Nanofibers for Hydrogen Storage and Characterization of these Materials." Taiwan Symposium on Hydrogen Storage in Carbon Nanomaterials, Taipei, Taiwan (October 18, 2005). (Invited speaker)  
--Included Panel Discussion and Laboratory Consulting Tour

***Lueking, A.D.*** “Catalyzed Carbon Composites for Hydrogen Storage.” 2004 International PEM Fuel Cell Conference, Industrial Technology Research Institute, Hsinchu, Taiwan (October 14, 2004). (Invited speaker)

### **Invited Domestic Presentations (Speaker’s name in italics)**

***Lueking, A.D.***, “Trends in Energy Science Research”, University of Nebraska Symposium, July 2020 (virtual).

***Lueking, A.D.***, “Spectroscopic probes for molecular-level identification and optimization of adsorption sites.” Storch Award Symposium in Honor of Andy Herring, National Meeting of the American Chemical Society, Boston, Massachusetts, August 19-23, 2018. (Invited Speaker)

***Lueking, A.D.***, Panelist, Workshop for students and post docs. Annual Meeting, North American Membrane Society. Lexington, Kentucky, June 10, 2018. (Invited Panelist)

***Lueking, A.D.*** “A Research Vision for 21<sup>st</sup> Century Land Grant Universities.” College of Engineering and Computing Seminar, Missouri University of Science and Technology, Rolla, Missouri, May 25, 2018. (Invited Seminar and Outreach)

***Lueking, A.D.*** “NSF Funding Opportunities for Separation Science and Engineering.” International Workshop on Characterization of Porous Materials, CPM-8: Characterization of Porous Materials: from Angstroms to Millimeters. Delray Beach, Florida, May 6-9, 2018. (Invited Poster and Outreach)

***Lueking, A.D.*** “From Process to Molecular Separations.” National Science Foundation. Alexandria, Virginia, May 3, 2018.

***Lueking, A.D.*** “Energy Materials through Convergent Research” Materials Science and Engineering Seminar. Iowa State University, Ames, Iowa, April 26, 2018.

***Lueking, A.D.*** “Convergent Research for New Energy.” Mechanical Engineering Seminar. Rowan University, Glassboro, New Jersey, March 1, 2018.

***Lueking, A.D.*** “Scientific Language Barriers: Communicating Environmental Science to the Public.” Humanities and the Environment Symposium, National Conservation Training Center, Shepherdstown, West Virginia, October 27, 2017. (Invited Keynote Speaker)

***Lueking, A.D.*** “Hydrogen Storage via Spillover through a Combined Experimental and Modelling Approach.” Graduate Seminar, Engineering Science and Mechanics, The Pennsylvania State University, University Park, Pennsylvania, November 12, 2014.

**Lueking, A.D.** “My Big Fat Greek Sabbatical.” Condensed, Atomic, and Molecular Physics Seminar, Department of Physics, The Pennsylvania State University, University Park, Pennsylvania, September 9, 2014.

**Lueking, A.D.** “A Hydrogen Spillover Odyssey: From Macroscopic Measurements to Atomic Design.” Colorado School of Mines, Golden, Colorado, March 6, 2014.

**Lueking, A.D.** “Nanomaterials for Gas Storage and Separations via a Trapping Mechanism.” James and Catherine Patten Seminar, University of Colorado, Boulder, Colorado, November 1, 2012.

**Lueking, A.D.** “Spectroscopic Evidence for Hydrogen Spillover.” NREL international working group on Weak Chemisorption, National Renewable Energy Laboratory, Golden, Colorado, February 2, 2012.

**Lueking, A.D.** “Adsorption to Flexible Metal-Organic Frameworks: Kinetics and History Effect.” Department Seminar, Physics Department, The Pennsylvania State University, University Park, Pennsylvania, October 4, 2011.

**Lueking, A.D.** “Hydrogen storage in metal-organic frameworks via spillover and gate-opening mechanism.” International Workshop: Adsorption at the nanoscale, a new frontier in fundamental science and applications. The University of Missouri, Columbia, Missouri, September 21-24, 2011.

**Lueking, A.D.** “Nanomaterials for Gas Storage and Separations via a Trapping Mechanism.” Chemical Engineering Colloquium, The Pennsylvania State University, University Park, Pennsylvania, February 9, 2010.

**Lueking, A.D.** “Novel Nanomaterials for Hydrogen Storage via Hydrogen Spillover and Hydrogen Trapping.” Research Seminar, National Institute of Standards and Technology, Gaithersburg, Maryland, July 14, 2009. (Invited)

**Lueking, A.D., Li, Q.** “Hydrogen Spillover at Low Pressure for Hydrogen Storage Applications--Effect of Oxygen Functional Groups.” 2009 American Chemical Society National Meeting, Symposium on “Molecular Hydrogen in Nanoporous Materials: Meeting Ground for Theory and Experiment”. Salt Lake City, Utah, March 22-26, 2009. (Invited)

**Lueking, A.D.** “Nanomaterials for Hydrogen Storage via Hydrogen Trapping.” Research Seminar, Texas A&M University, College Station, Texas, February 27, 2009. (Invited)

**Lueking, A.D.** “Nanocarbons: New Materials and Synthesis Routes.” Air Products and Chemicals, Allentown, Pennsylvania, December 19, 2006. (Invited)

**Lueking, A.D.** “Design of Materials for Hydrogen Storage via Hydrogen Spillover.” Oak Ridge National Laboratory, Oak Ridge, Tennessee, November 4, 2006. (Invited)

**Lueking, A.D.** “New Nanocarbon Materials via Ball Milling.” Wright-Patterson Airforce Base, Dayton, Ohio, May, 2006. (Invited)

**Lueking, A.D.** “Hydrogen Spillover for Adsorption Applications.” University of Pittsburgh, Pittsburgh, Pennsylvania, September 24, 2004. (Invited)



**Lueking, A.D.** "Design of Materials for Hydrogen Storage." 2004 Annual Materials Solutions Conference: Hydrogen Fuel Economy, American Society for Materials (ASM International), Columbus, Ohio, October 18-21, 2004. (Invited)

**Lueking, A.D.** "Carbon Nanotubes: Small Materials for Large Markets." Technological Transfer Session, Carbon Research Center, University Park, Pennsylvania, September 19, 2003. (Plenary Lecture)

#### **Other Invited Oral Presentations for Project Reports (Speakers Name in Italics).**

*Xu, E.S., Maleski, K., Crespi, V.H., Froudakis, G., Lueking, A.D.* Poster: "New Carbon Nanostructural Motifs and an Expansion of Euler's rules for mixed sp<sup>2</sup>/sp<sup>3</sup> Carbon," (Project Report) DOE-BES Contractor Review Meeting, November 19, 2013. (Supervising Author)

**Lueking, A.D.,** Wang, C.Y., Li, J. " Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching" (Project Report) Hydrogen Storage Tech Team Meeting, Detroit, MI (attended via teleconference), September 19, 2014. (Supervising Author)

*Wang, C.Y., Lueking, A.D.,* Li, J. " Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching" (Project Report) Hydrogen Storage Tech Team Meeting, Washington DC, May 16, 2013. (Supervising Author)

*Wang, C.Y.,* Li, Q, Sircar, S., Liu, X., **Lueking, A.D.,** Li, J., Cole, M. " Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching" (Project Report) Hydrogen Storage Tech Team Meeting, Detroit, MI, September 15, 2011. (Supervising Author)

**Lueking, A.D.,** Liu, X.M., Tang, Y., Xu, E.S., Fitzgibbons, T.C., Gutierrez, H.R., Badding, J.V., Crespi, V.H. "In-Situ Micro Raman Detection of Reversible Basal Plane Hydrogenation in Pt-doped Activated Carbon," (Project Report) DOE-BES Contractor Review Meeting, September 21, 2012. (Supervising Author)

*Liu, X.M.,* Tang, Y., Xu, E.S., Fitzgibbons, T.C., Gutierrez, H.R., Badding, J.V., Crespi, V.H., **Lueking, A.D.** Poster: "Hydrogen Caged in Carbon—Exploration of Novel Carbon-Hydrogen Interactions," (Project Report) DOE-BES Contractor Review Meeting, September 19-21, 2012. (Supervising Author)

**Lueking, A.D.,** "Hydrogen Trapping though Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching," (Project Report), Annual Merit Review Meeting, Washington DC, May 12, 2011. (Supervising Author)

**Lueking, A.D.,** "Hydrogen Trapping though Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching," (Invited/Report), Annual Merit Review Meeting, Washington DC, June 9, 2010. (Supervising Author)

**Lueking, A.D.,** "Thoughts on Viability of Hydrogen Spillover for Moderate Temperature Hydrogen Storage," (Invited) Chemisorption Workshop, National Renewable Energy Laboratory, August 10-11, 2010. (Supervising Author)

**Lueking, A.D.,** "Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching," (Project Report) Hydrogen Storage Tech Team Meeting, Detroit, MI, August 27, 2009. (Supervising Author)

## Conference Presentations with Proceedings or Preprints

Ray, P., Wang, C.Y., **Lueking, A.D.** Kinetic Studies of N<sub>2</sub> Adsorption on Polymers of Intrinsic Microporosity (PIM-1) to Study the Effect of  $\pi$ - $\pi$  Stacking Interaction Between N<sub>2</sub> and the C-N Functionalities, AIChE Proceedings, 2016.

**Lueking, A.D.**, Ray, P., Xu, E., Gidley, D., Crespi, V. H., Badding, J.V. "Nitrogen Interaction with Single-Wall Carbon Nanotubes Probed via In-Situ Vibrational Spectroscopy, The World Conference on Carbon, State College, PA, S10, O6-1, July 10-15, 2016.

Li, Q., **Lueking, A.D.** "Carbon oxidation to enhance hydrogen storage by hydrogen spillover," *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 53 (2), 2008.

Sakti, A., Clifford, C.E.B., **Lueking, A.D.** "Structural Evolution of Anthracite Coals During Reactive Ball Milling," *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 53 (1), 2008.

Fonseca, D.A., **Lueking, A.D.** "Influence of Thermal Treatment on the Structure of Exfoliated Graphite Nanofibers" *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 51 (2), 2006.

Burgess-Clifford, C.E., Narayanan, D.L., Van Essendelft, D.T., Jain, P., Sakti, A., **Lueking, A.D.** "Differences in graphitization behavior of pretreated anthracite coal" *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 51, (1), 2006.

**Lueking, A.D.**, Pan, L., Narayanan, D., Clifford, C.E.B. "Exfoliated Graphite Nanofibers for Hydrogen Storage," *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 50 (2), 2005.

**Lueking, A.D.** "Hydrogen Spillover Modeling: Applications in Hydrogen Storage," *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* 50 (1), 2005.

**Lueking, A.D.**, Clifford, C.E.B., Narayanan, D. L. "Induced Defects in Carbonaceous Materials for Hydrogen Storage," *Prepr. Pap.-Am. Chem. Soc., Div. Fuel Chem.* **2004**, 49 (2).

**Lueking, A.D.** "Design of Materials for Hydrogen Storage via Hydrogen Spillover," *Proceedings of the National Hydrogen Association, Hydrogen: A Clean Energy Choice.* April 26-30, 2004.

**Lueking, A.D.** "Carbon-Metal Composites: Hydrogen Spillover to Enhance Hydrogen Storage" *Proceedings of the World Renewable Energy Conference VIII*, August 29-September 3, 2004.

Soderstrom S.B., **Lueking A.D.**, Kim M.S., Huang W.L., Weber W.J. "Effects of soil/sediment organic matter on mineralization, desorption, sequestration, and transformation of phenanthrene." *Abstracts of Papers of the American Chemical Society*, 220: 142-ENVR (1), August 20, 2000.

Bryce, A.L., **Lueking, A.D.**, Clark, S.B., Yu, G.A, Serkiz, S.M. "Factors Affecting Lanthanide and Actinide Adsorption to Soils and Model Surfaces." Abstract of Papers 211th National Meeting of the American Chemical Society, New Orleans, LA; American Chemical Society; Washington, DC, 1996; Geochemistry Division.

## Other Presentations (Speaker in Italics)

*Wang, C.Y., Wang, L., Li, J., Lueking, A.D.* 2016 "Oxygen Selectivity of RPM3-Zn Gate-Opening Metal-Organic Framework." 2016 Annual Meeting of the American Institute of Chemical Engineers, San Francisco, CA (November 17, 2016). (Supervising Author)

*Lueking, A.D.*, "A Chemical Engineer's Guide to Contemporary Problems of Climate, Energy and Environment." Paper 619g, 2016 Annual Meeting of the American Institute of Chemical Engineers, San Francisco, CA (November 16, 2016). (Supervising Author)

*Ray, P., Xu, E., Gidley, D., Crespi, V. H., Badding, J.V., Lueking, A.D.* "Nitrogen Interaction with Various 1D and 3D Nanostructured Carbon Architectures Probed via In-Situ Vibrational Spectroscopy." Paper 407f, 2016 Annual Meeting of the American Institute of Chemical Engineers, San Francisco, CA (November 15, 2016). (Supervising Author)

*Ray, P., Xu, E., Lueking, A.D., Crespi, V., Badding, J.V.* "Nitrogen Raman spectroscopy as a probe for pore size determination in carbon materials in the microscale." ACS Fall Meeting, Boston, MA (August 17, 2015). (Supervising Author)

*Lueking, A.D.* "Evaluation of Kinetic Models to Describe Sigmoidal Adsorption Rates in Gate-Opening Metal Organic Frameworks for Kinetic Separations." 2014 ACS Central Regional Meeting, American Chemical Society, Pittsburgh, Pennsylvania (October 31, 2014). (Speaker)

*Lueking, A.D.* "Final Report: Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching." Department of Energy, Energy Efficiency and Renewable Energy. Golden, CO (June 10, 2014). (Speaker, Principal Investigator)

*Wang, C.Y., Gong, Q., Li, J., Lueking, A.D.* "Prebridge Technique to Incorporate Transition Metal to Metal-Organic Frameworks for the Purposes of Catalysis and Hydrogen Storage via Spillover Effect." AIChE Annual Meeting, San Francisco, CA (November 5, 2013). (Supervising Author)

*Lueking, A.D.* "Effect of Equilibration Time and Reduced Conditions on Adsorption to Gate-Opening Metal-Organic Frameworks", AIChE Annual Meeting, Minneapolis, MN (October 19, 2012). (Speaker)

*Xu, E.S., Maleski, K., Crespi, V.H., Froudakis, G., Lueking, A.D.* "Poster and Project Report: New Carbon Nanostructural Motifs and an Expansion of Euler's rules for mixed sp<sup>2</sup>/sp<sup>3</sup> Carbon." DOE-BES Contractor Review Meeting, (November 19, 2013). (Co-Author, conceived preliminary idea with Froudakis, performed simulations)

*Lueking, A.D., Wang, C.Y., Li, J.* "Project Report: Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching." Hydrogen Storage Tech Team Meeting, Detroit, MI (September 19, 2014). (Speaker, Principal Investigator)

*Wang, C.Y., Lueking, A.D., Li, J.* "Project Report: Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching." Hydrogen Storage Tech Team Meeting, Washington DC (May 16, 2013). (Supervising Author, Principal Investigator)

*Wang, C.Y., Li, Q., Sircar, S., Liu, X., Lueking, A.D., Li, J., Cole, M.* "Project Report: Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-induced Switching." Hydrogen Storage Tech Team Meeting, Detroit, MI (September 15, 2011). (Supervising Author, Principal Investigator)

**Lueking, A.D.**, Liu, X.M., Tang, Y., Xu, E.S., Fitzgibbons, T.C., Gutierrez, H.R., Badding, J.V., Crespi, V.H. "Project Report: In-Situ Micro Raman Detection of Reversible Basal Plane Hydrogenation in Pt-doped Activated Carbon." DOE-BES Contractor Review Meeting (September 21, 2012). (Speaker, Principal Investigator)

*Liu, X.M.*, Tang, Y., Xu, E.S., Fitzgibbons, T.C., Gutierrez, H.R., Badding, J.V., Crespi, V.H., **Lueking, A.D.** "Project Report and Overview: Hydrogen Caged in Carbon—Exploration of Novel Carbon-Hydrogen Interactions (Poster)." DOE-BES Contractor Review Meeting (September 19-21, 2012). (Supervising Author and co-Poster presenter, Principal Investigator.)

**Lueking, A.D.**, Li, J. Development of Novel Nanoporous Materials for Use as Hydrogen Adsorbents. Hydrogen Storage Tech Team Meeting, Southfield, Michigan (September 20, 2012). (Speaker, Principal Investigator)

**Lueking, A.D.**, Li, J. Development of Novel Nanoporous Materials for Use as Hydrogen Adsorbents, Department of Energy Annual Merit Review Meeting, Energy Efficiency and Renewable Energy, Washington DC (May 16, 2012). (Speaker, Principal Investigator)

**Lueking, A.D.**, Badding, J.V., Crespi, V. Hydrogen Caged in Carbon: Exploration of Novel Carbon-Hydrogen Interactions. Department of Energy Annual Merit Review Meeting, Basic Energy Sciences, Washington DC (May 16, 2012). (Poster Presenter, Principal Investigator)

**Lueking, A.D.** "Project Report: Hydrogen Trapping though Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching." Annual Merit Review Meeting, Washington DC (May 12, 2011). (Speaker, Principal Investigator)

**Lueking, A.D.** "Project Report: Hydrogen Trapping though Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching." Annual Merit Review Meeting, Washington DC (June 9, 2010). (Speaker, Principal Investigator)

**Lueking, A.D.** "Thoughts on Viability of Hydrogen Spillover for Moderate Temperature Hydrogen Storage." Chemisorption Workshop, National Renewable Energy Laboratory (August 10-11, 2010). (Speaker, Invited to International Working Group on Viability of Spillover)

**Lueking, A.D.** "Project Report: Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching." Hydrogen Storage Tech Team Meeting, Detroit, MI (August 27, 2009). (Speaker, Principal Investigator)

*Li, Q.*, **Lueking, A.D.** "Evidence for Hydrogen Spillover at Extremely Low Pressure for Pt- and Pd- Supported on Carbon Materials." 2008 AIChE Annual Meeting, Philadelphia, PA (November 2008) (Supervising Author)

**Lueking, A.D.**, Gatica, S., Cole, M.W. "Imbibition Transition and the Gate Effect in Adsorption." 2008 AIChE Annual Meeting, Philadelphia, PA (November 2008). (Speaker and Poster presenter)

*Gatica, S. M.*, Kim, H.-Y., **Lueking, A. D.**, Johnson, J. K.; Cole, M.W. "Universal and nonuniversal supercritical adsorption in pores." American Physical Society Meeting (March 2008). (Co-Author)

*Burgess-Clifford, C.E.*, Narayanan, D. L., Van Essendelft, D.T., Jain, P., Sakti, A., **Lueking, A.D.** "Graphitization behavior of pretreated anthracite coal." 32nd International Technical Conference on Coal Utilization & Fuel Systems, Clearwater, FL (June, 2007). (Co-Principal Investigator, Supervision of students)

**Lueking, A.D.**, Sakti, A., Clifford, C.E.B., Fonseca, D.A. "Investigation of reactive ball milling of anthracite coal for the optimization of a novel combined hydrogen production and storage process." 2006 AIChE Annual Meeting, San Francisco, CA, (November 15, 2006). (Speaker and Supervising Author)

Sakti, A., Clifford, C.E.B., **Lueking, A.D.** "Hydrogen Production from and Subsequent Trapping in Ball Milled Anthracite Coal." *Pittsburgh Coal Conference*, (September 27, 2006). (Supervising Author)  
--Selected for Award: *Honorable Mention, Technical Poster*

**Lueking, A.D.**, Pan, L., Narayanan, D., Clifford, C., Rajagopalan, R. "Exfoliated Graphite Nanofibers: Structure, Adsorption, and Electric Double-Layer Capacitance." AIChE National Meeting, Cincinnati, OH (November 2, 2005). (Speaker, Principal Investigator)

**Lueking, A.D.**, Jain, P., Schaible E. "Stochastic analysis of high-pressure hydrogen adsorption via spillover on supported catalysts." AIChE National Meeting, Cincinnati, OH (November 4, 2005). (Speaker, Principal Investigator)

**Lueking, A.D.**, Rajagopalan, R., Clifford, C., Pan, L., Narayanan, D. "Exfoliated Graphite Nanofibers for Energy Storage. With General Commentary on Carbon-based adsorbents for H<sub>2</sub> storage." *Carbons for a Greener Planet; Research Frontiers Workshop*, American Carbon Society, University Park, PA, May 23, 2005. (Speaker, Principal Investigator)

**Lueking, A.D.** "Hydrogenated Anthracite and Synthesis of Nanocrystalline Diamond." CPCPC Fall Meeting, University Park, PA (November 9, 2005). (Speaker, Principal Investigator)

Clifford, C.E.B, **Lueking, A.D.**, "Mechano-Thermal Method to Thermal Method to Produce Carbon Nanotubes from Produce Carbon Nanotubes from Coal." CPCPC Proposal Presentation, Technology Transfer Meeting, Parma, Ohio (May 18, 2005). (Co-PI)

Narayanan, D., Clifford, C.E.B., **Lueking, A.D.** "Project Update: Nanostructured Anthracite-Metal Composites for Hydrogen Storage." CPCPC Technology Transfer Meeting, Parma, Ohio (May 18, 2005). (Principal Investigator)

**Lueking, A.D.**, Jain, P. "Hydrogen Storage of Catalyzed Carbon Composites: Kinetic Modeling, Rate Studies, and Equilibrium", American Institute of Chemical Engineers Annual Meeting, Austin, TX (November 2004). (Speaker, Principal Investigator)

## FUNDED PROJECTS

Project Title Micro-Credentials in Extractive Technologies at Montana Technological University (pending, anticipated September 1, 2024)  
PI/Co-PI **A.D. Lueking (PI)**  
Sponsor Defense Production Agency  
Dates September 2024 – August 2027  
Total Budget \$6,644,347  
Role Principal Investigator (10% effort; interim project manager, 100% effort)

Project Title Thermo-Kinetic Modeling of Asphaltene Flocculation during Gas Injection Flow  
PI/Co-PI Abdulmohsin Imqam (PI), **A.D. Lueking (co-PI)**  
Sponsor National Science Foundation  
Dates 1/1/21 – 12/31/2023 (36 months)  
Total Budget \$450,000 (25% shared credit)  
Role Co-Principal Investigator, 0.5 month effort

Project Title Planning Grant: Engineering Research Center for Integrative Manufacturing and Remanufacturing Technologies (iMart) to Spur Rural Development  
PI/Co-PI Frank Liou (PI), J. Sarangapani, **A.D. Lueking (co-PI)**, O. Suarez, C. Seepersad  
Sponsor National Science Foundation  
Dates 8/26/2019-6/3/2019  
Total Budget \$100,000  
Role Co-Principal Investigator, 0.0 month effort

Project Title WORKSHOP: Resilient Supply of Critical Minerals  
PI/Co-PI Marek Locmelis (PI), **A.D. Lueking (co-PI)**, M. Moats, K. Awuah-Offei, A. Krolikowski  
Sponsor National Science Foundation  
Dates 1/1/20 – 12/31/2020  
Total Budget \$49,886  
Role Co-Principal Investigator, 0 month effort

Project Title Probing Oxygen Selectivity in a Flexible Metal-Organic Framework Using In Situ Spectroscopy  
PI/Co-PI **A. D. Lueking (Original PI)** / Rioux, Robert (Substitute PI)  
Sponsor National Science Foundation  
Dates 9/1/15 to 8/31/2017  
Total Budget \$103,249 (90% funding)  
Role Principal Investigator

Project Title New, GK-12: Carbon Educators and Researchers Together for Humanity  
 PI/Co-PI R. Diehl; **co-PIs: Lueking**, Smithwick, Boyer, Ward  
 Sponsor National Science Foundation  
 Dates 03/15/2010 to 08/28/16  
 Total Budget \$2,847,750  
 Role Proposal Writing, Advisory Board Meetings, 0% funding

Project Title Hydrogen Caged in Carbon—Exploration of Novel Carbon-Hydrogen Interactions  
 PI/Co-PI **A. D. Lueking (PI)**, Badding, Crespi, Eser  
 Sponsor Department of Energy, Basic Energy Sciences  
 Dates 9/1/2009-9/14/2015  
 Total Budget \$1,020,000  
 Role Principal Investigator, ~60% funding

Project Title Amendment: Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching  
 PI/Co-PI **A. Lueking**  
 Sponsor Department of Energy, Energy Efficiency and Renewable Energy  
 Dates 12/1/2010-6/30/2014  
 Total Budget \$75,000  
 Role Principal Investigator, 100% funding

Project Title Hydrogen Trapping through Designer Hydrogen Spillover Molecules with Reversible Temperature and Pressure-Induced Switching  
 PI/Co-PI **A. Lueking**; co-PIs: Jing Li, Milton Cole  
 Sponsor Department of Energy, Energy Efficiency and Renewable Energy  
 Dates 09/01/08 to 6/30/2014  
 Total Budget \$1,512,922  
 Role Principal Investigator, ~60% funding\*

Project Title Optimization of Hydrogen Storage via Spillover through a Combined Experimental and Modeling Approach  
 PI/Co-PI G. Froudakis; **A. Lueking (Fellow)**  
 Sponsor Marie Curie International Incoming Fellowship, European Commission  
 Dates 6/1/2012 - 6/1/213  
 Total Budget \$147,500  
 Role Fellow, 100% funding

Project Title Fundamental Investigations of Carbon-Metal Composites for Catalyzed Hydrogen Storage—Supplement for Collaborative Research with Undergraduate Institutions  
 PI/Co-PI **A. Lueking**, co-PI Prof. Hye-Young Kim of Southeastern Louisiana University  
 Sponsor American Chemistry Society (Petroleum Research Fund)  
 Dates 6/1/07-8/31/07  
 Total Budget \$8,000  
 Role Principal Investigator, 100% funding (to salary of visiting scientist)



Project Title Carbon-based Energy Storage Devices  
 PI/Co-PI **A. Lueking**  
 Sponsor Pennsylvania State University, Deike Research Grant  
 Dates 8/1/06 to 7/31/09  
 Total Budget \$45,000  
 Role Principal Investigator, 100% funding

Project Title Using Fuel and Combustion Conditions to Alter the Nanostructure and Reactivity of Diesel Soot  
 PI/Co-PI Boehman; **Co-PI Lueking**  
 Sponsor National Science Foundation  
 Dates 4/1/2006 to 3/31/2009  
 Total Budget \$240,000  
 Role Co-Principal Investigator, Conceived a portion of the ideas, advised participating students in materials characterization, ~20% funding

Project Title Development of Doped NanoPorous Carbons for Hydrogen Storage  
 PI/Co-PI **A. Lueking**; co-PI Prof. John Badding of Chemistry  
 Sponsor Department of Energy (University Coal Research Program)  
 Dates 1/1/2006 to 12/31/2008  
 Total Budget \$200,000  
 Role Principal Investigator, ~80% funding

Project Title Fundamental Investigations of Carbon-Metal Composites for Catalyzed Hydrogen Storage  
 PI/Co-PI **A. Lueking**  
 Sponsor American Chemistry Society (Petroleum Research Fund)  
 Dates 9/1/05-8/31/07  
 Total Budget \$35,000  
 Role Principal Investigator, 100% funding

Project Title Mechano-Thermal Method to Produce Carbon Nanotubes from Coal  
 PI/Co-PI Burgess-Clifford; **co-PI A.D. Lueking**  
 Sponsor Department of Energy: National Energy Technology Laboratory, Consortium for Premium Carbon Products from Coal  
 Dates 07/01/05 - 12/31/06  
 Total Budget \$80,648  
 Role Co-Principal Investigator, ~50% funding\*

Project Title Carbon Nanostructures from Anthracite Coal  
 PI/Co-PI Burgess-Clifford; **co-PI: A.D. Lueking**  
 Sponsor Department of Energy: National Energy Technology Laboratory, Consortium for Premium Carbon Products from Coal  
 Dates 03/01/05 - 02/28/06

Total Budget	\$35,000
Role	co-Principal Investigator, Supervised/advised students, edited reports, project meetings, ~50% funding
Project Title	Kinetic Modeling of Hydrogen Spillover
PI/Co-PI	<b>A. Lueking</b>
Sponsor	Penn State University: Wilson Initiation Grant, College of Earth and Mineral Sciences
Dates	05/01/04 - 04/30/05
Total Budget	\$7500
Role	Principal Investigator, Supervised summer student, 100% funding
Project Title	Nanostructured Anthracite-Metal Composites for Hydrogen Storage
PI/Co-PI	<b>A. Lueking</b>
Sponsor	Department of Energy: National Energy Technology Laboratory, Consortium for Premium Carbon Products from Coal
Dates	3/1/2004-8/31/2005
Total Budget	\$79,877
Role	Principal Investigator, 100% funding
Project Title	Start-up Funds
PI/Co-PI	<b>A.D. Lueking</b>
Sponsor	The Pennsylvania State University
Dates	2003-2009
Total Budget	\$337,628, which included \$200,000 unrestricted research funds and equipment purchases, 8 semesters graduate research assistantships, 3 months summer salary
Role	Principal Investigator

**SERVICE** (Includes only service as a faculty member; excludes full administrative appointments)

### **Record of committee work**

#### Department-level (Missouri S&T):

- Student Recruiting, Miner Immersion, 2020
- Department Chair Search Committee, Nuclear Engineering & Radiological Sciences, 2020-2021
- Department Chair Search Committee, Chemical & Biochemical Engineering, 2019-2020
- Committee Member, Graduate Examinations, Chemical Engineering
- Proposed CBE + MNE merger committee and review, 2018-2019

#### Department-level (Penn State):

- Graduate Committee, Energy & Mineral Engineering, 2015-2016.
  - Curriculum Review Subcommittee, January 2016-March 2016
  - Candidacy Examination Subcommittee, December 2015-March 2016
- Communication Committee, Chemical Engineering, 2014-2016.
- Co-Director, Nanomaterials Program, EMS Energy Institute, 2011-2016.
- Committee member, Department Head Search Committee in EME, 2012-2013.
- Committee to Evaluate Graduate Kinetics Course, Chemical Engineering, 2010-2011.
- Committee member, EME Graduate Admissions Committee, 2008-2012.
- Member, EME/EGEE Faculty Search Committee, 2006-2007; 2008- 2009
- Committee to Develop Salary Release Policy, EGEE, 2005.
- Working Group for Department Realignment, EGEE, 2005-2006.

#### College-level (Missouri S&T):

- Chair, Search Committee, Associate Dean of Academic Affairs, 2020
- Member, Search Committee, Intelligent Systems Center Director, 2020-2021
- Chair, College Space Committee, 2020-2021
- Chair, College Emerging Research Committee, 2020-2021
- Member, College Safety Committee (at request of Dean), 2018-2020

#### College-level (Penn State):

- Faculty-at-Large, College of Engineering, President's New Student Convocation, Penn State, August 22, 2015.
- Outside Member, Material Science and Engineering Faculty Search Committee, 2006-2008.
- Committee Member, Analytical Research Group Strategic Planning Focus Group, Energy Institute, August 2004.

#### University-level (Missouri S&T):

- Co-Chair, Faculty Advisory Board, Kummer Institute, 2020-2021.
- Member, Trustees Research Committee, 2020-2021.
- Member, Title IX Director Search Committee, 2021.
- Member (Research co-lead), Selection of Kummer Doctoral Innovation & Entrepreneurship Fellows
- Chair, Lab Access Exception Committee for COVID-19 pandemic, 2020.
- COVID Response Team: Member of Travel Exemption Group, Site-wide incident command team
- U.S. News & World Report Ranking Group, "Strategy" point person, 2019-2021.
- Member, Tuition remission policy recommendation committee (Appointed by VCR)
- Distinguished Professor Screening Committee (Appointed by Provost)
- Assigned reviewers for system-wide seed proposals using optimization program

#### University-level (Penn State):

- Committee Member, Dissertation Review Committee, Research Integrity Office, 2016.
- Committee Member, Research Misconduct Investigation, Research Integrity Office, 2014 - 2015.
- Advisory Board, Carbon EARTH, a NSF GK-12 Outreach Project at Penn State, 2010-2015.
- Alternate, Fulbright Selection Committee, Fall 2014.
- Member, Graduate Council Committee on Fellowships and Awards, 2008-2009.

#### **Participation in University-wide governance bodies**

- Graduate Council, College of Earth and Mineral Sciences representative, Penn State, 2008-2010.

#### **Record of contributions to University's programs to enhance equal opportunity and cultural diversity**

- Gender Diversity Task Force, Chemical Engineering, Penn State, 2013.
- **Lueking, A.D. (presenter)**; Keynote Speech: "What will you do to Change the World?", Expanding Your Horizons STEM Program, The Pennsylvania State University, February 4, 2012.
- Annual Recognition from the Penn State Commission for Adult Learners for Motivation and Personalized Attention to Adult Undergraduate Learners at University Park, 2014
- Co-Director, Engineering a Sustainable World (Middle School, All-girls Science Camp), 2012

#### **Assistance to student organizations**

- Panelist, Missouri Science Policy Workshop, April 9, 2019
- Panelist, "Career Path Series #2: Academia", University of Michigan, Ann Arbor, MI (March 7, 2005).
- Panelist, "Reaction Discussion on 'How President of Harvard University Views Women In Science and Engineering', University Park, PA (January 31, 2005).
- EGEE Colloquium Speaker, "Managing Your Grad School Experience: Amorphous Carbon Or Single-Wall Nanotube?" (October 23, 2003).

#### **Service to governmental agencies**

- International Committee on Weak Chemisorption for Hydrogen Storage, National Renewable Energy Laboratory, August 9-11, 2010 (Invited).
  - Committee members included, in alphabetical order: Channing Ahn (CalTech), Craig Brown (NIST), Jeff Blackburn (NREL), Alan Cooper (Air Products), Thomas Gennett (NREL), Craig Jensen (Univ. Hawaii), Michael Hirscher (Max Planck Institute, Germany), Katie Hurst (NREL), Michel Latroche (CNRS, France), **Angela Lueking (Penn State)**, Phil Parilla (NREL), Claudia Zlotea (CNRS, France), Boris Yakobson (Rice), Plamen Atanassov (Univ. New Mexico)
  - Final report: [http://www.hydrogen.energy.gov/pdfs/review11/st021\\_gennett\\_2011\\_o.pdf](http://www.hydrogen.energy.gov/pdfs/review11/st021_gennett_2011_o.pdf)
- International round robin sample testing for verification of hydrogen adsorption methods, Organized by the National Renewable Energy Laboratory, August 2010 - May 2012 (invited).
  - Final report and results of validation: [[Link](#)]
- Peer Reviewer of Federal Grants
  - Department of Energy, SBIR Program, 2019.
  - National Science Foundation, CBET Division, dates vary
  - National Science Foundation SBIR/STTR Program, Phase I BCT: Environmental Technologies 2, Arlington, VA, 2009.
  - Phase I research proposals; Department of Energy FY 2005 Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Solicitation.

#### **Service to public and private organizations**

- Alumni Advisory Board Member, [Chem. & Biomolec. Engineering](#), University of Nebraska, 2014-2022.

- Missouri Statewide Manufacturing Task Force (Joe Driskill Chair), 2020-2021.
- Board of Directors, Engineering Research Council ASEE, 2020-2021 (elected).
- Treasurer, Women in Engineering Division, American Society of Engineering Education, 2019-2021 (elected)
- Executive Board Member, Ozark Biomedical Initiative, 2018-2021.
- University Missouri, Ameren Accelerator, Point of Contact for Missouri S&T, 2019.
- Alumni Advisory Board, The University of Nebraska-Lincoln Chemical and Biomolecular Engineering, September 2014-2021 (appointed).
- Alternate Councilor, Fuel Chemistry Division, American Chemical Society, 2011-2012 (elected).
- Treasurer, Fuel Division, American Chemical Society, 2007-2010 (elected).
- Peer Reviewer, American Chemical Society Petroleum Research Fund, 2005.
- Journal Review (e.g. *Appl Catal A*; *Appl Phys Lett*; *Appl Surf Sci*; *Carbon*; *Chem Phys Lett*, *Fuel Processing Tech*, *Int J Hydrog Energ*, *J Alloys Comps*, *J Amer Chem Soc*, *J Catal*, *J Engin Edu*, *J Low Temp Phys*, *J Phys Chem Solids*, *J Phys Chem*, *Langmuir*, *Micropor Mesopor Matl*)

#### **Organizing conferences, service on conference committees**

- Sustainable Energy Forum, American Institute of Chemical Engineers
- Separations Division, Adsorption (Area 2e) American Institute of Chemical Engineers
  - Director, 2018-present
  - 2016, Session Chair, "Characterization of Materials", 2016 Annual Meeting, San Francisco, CA
  - 2015, Session Chair, "Adsorption Applications for Sustainable Energy and Chemicals", 2015 Annual Meeting, Salt Lake City, UT. November 8-12, 2015.
- Carbon Society
  - 2016, Symposia Chair, "Metal/Carbon Interactions", Catalysis and Electrocatalysis Division, The World Conference on Carbon, State College, PA, July 10-15, 2016.
  - Co-organizer, Research Workshop: "Carbon Workshop", Sponsored by the Pennsylvania State University, State College, Pennsylvania. October 16-17, 2006.
  - Co-organizer, Research Needs Workshop: "Carbons for a Greener Planet", Sponsored by the American Chemical Society, State College, Pennsylvania. May 22-25, 2005.
- World Congress on Momentum, Heat and Mass Transfer
  - 2016, Scientific Committee Member / Reviewer, International Conference on Mass Transfer Operations and Devices, Prague, Czech Republic, April 4 - 5, 2016
- Fuel Division, American Chemical Society
  - Co-organizer, ACS Symposium: Catalysis in Fuel Chemistry, 229<sup>th</sup> ACS Spring National Meeting, San Diego, CA, March 13-17, 2005.