ДЛЯ ВИЗЫ ТАЛАНТОВ · O-1 · EB-1A · EB-2 NIW

Заключения профессоров США

Независимая экспертная оценка ваших достижений от действующего профессора американского университета — сильное доказательство значимости вашей работы.

Что подтверждает письмо

- Значимость ваших достижений для экономики США и вашей отрасли
- Оригинальность разработок, методик и подходов к бизнесу
- Ваш вклад, который выходит за рамки рутинной практики
- Вашу квалификацию и экспертный уровень

Как выглядит

- Официальный бланк университета
- Подпись действующего профессора
- Полное CV и подтверждение должности
- На английском — для пакета документов в USCIS

Сферы

AI и IT · Бизнес и предпринимательство · Инженерия · Строительство и архитектура · Наука · Медицина · Энергетика и экология · Сельское хозяйство · Финансы · Маркетинг и медиа · Образование · Искусство и дизайн · Спорт · Другие сферы

Психология пока не предоставляется. Нет вашей сферы — напишите, подберём профессора.

КАК ЭТО РАБОТАЕТ

1

Заявка

На yermakpr.com: ваша профессия и что нужно оценить. Оставьте email для переписки и согласований — и по возможности Telegram или WhatsApp.

2

Подбор профессора

Находим профессора под вашу сферу и подтверждаем, что работа будет выполнена.

3

Оплата и документы

100% предоплата по договору. Вы передаёте документы для анализа.

4

Готовое письмо

Через 5–7 дней — заключение на бланке университета, как в примере ниже. Оценка всего кейса — до 10 дней.

Стоимость

$1280

Письмо как в примере ниже. Включает оценку от одного до 5 документов: патенты, разработки, публикации, проекты. Оценка всего кейса — от $2330.

Важно

Профессор оценивает только то, что вы предоставили. Без документов и данных для анализа письмо подготовить невозможно — чем полнее материалы, тем сильнее заключение.

Гарантия выполнения — или возврат денег

Мы не юридическая фирма и не оказываем иммиграционных услуг. Заключение — независимое мнение профессора; решение по визе принимает USCIS. Условия: yermakpr.com/terms

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ПРИМЕР

Реальное заключение профессора Purdue University

Ниже — письмо, которое оценивает один документ клиента: украинский патент на полезную модель. Имена клиента и профессора скрыты.

Стр. 1–4

Анализ вашего кейса

Профессор разбирает разработку, её новизну, практическую ценность и значимость для отрасли и США, и даёт итоговую оценку вклада.

Стр. 5–25

Credentials профессора

Подтверждение должности от университета и полное CV: гранты, публикации, награды. Это показывает USCIS вес эксперта.

Пример приведён в обезличенном виде. Состав и объём вашего письма зависят от предоставленных материалов.

PURDUE UNIVERSITY | School of Sustainability Engineering and Environmental Engineering
PURDUE UNIVERSITY | Lyles School of Civil and Construction Engineering

August 10, 2026

EXPERT OPINION ANALYSIS LETTER

Candidate's Last Name:
Candidate's First Name:

Evaluation Prepared By: **PROFESSOR**

To Whom It May Concern,

I have independently reviewed the materials submitted to me concerning Ukrainian Utility Model Patent No. 162886, entitled "Fertilizer Application Device," granted on May 6, 2026, together with supporting technical documentation describing the engineering concept developed by Mr.

I am a Full Professor at Purdue University, jointly appointed in the School of Sustainability Engineering and Environmental Engineering and the Lyles School of Civil and Construction Engineering, both of which are housed within Purdue's College of Engineering. My academic training includes a Ph.D. and M.S. in Environmental Engineering and Science from the California Institute of Technology and a B.A. in Biochemistry from the University of California, Berkeley. My research and professional work center on the intersection of environmental sustainability, water resource management, and engineering systems, with particular attention to technologies that reduce the environmental footprint of industrial and agricultural operations. Over the course of my career, I have conducted and led research on water quality, nutrient management, life cycle assessment, sustainable irrigation practices, and the design of engineering systems intended to improve the precision and efficiency of resource use. I have collaborated with academic and industry partners across these areas for nearly three decades. My observations and conclusions in this letter are based solely on my independent professional evaluation of the materials provided to me. I have no employment, consulting, supervisory, financial, or personal relationship with Mr. or with Nutrition Inc. that would affect the independence of this opinion.

The invention described in Patent No. 162886 addresses a well-recognized engineering challenge in irrigation practice: the reliable, controlled, and safe introduction of liquid fertilizers directly through an operating irrigation pipeline, a method commonly referred to as fertigation. While the Venturi effect that drives the injection mechanism of this device has been understood and applied in fluid mechanics for well over a century, the contribution of this patent does not depend on the discovery of a new physical phenomenon. Rather, the technical contribution consists in the integration of several established engineering components, including a Venturi injector, a fertilizer solution reservoir, a dosing control valve, a spring-loaded ball check valve, an inlet suction filter, a bypass pipeline connection, and a sealed tank assembly with an air-permeable

lid, into a single compact and operationally coherent system. That integration work is itself the engineering contribution, and it is where the design judgment and practical expertise of the inventors is expressed.

From a systems engineering standpoint, the configuration described in the patent reflects deliberate choices aimed at reliable performance under real field conditions. Positioning the Venturi tube in the upper portion of the tank, incorporating a spring-loaded ball check valve to prevent reverse flow into the fertilizer reservoir, using threaded connections at the tube ends to ensure compatibility with standard pipeline fittings, designing the tank with an inclined bottom to facilitate complete drainage of the fertilizer solution, and configuring the lid to permit passive air intake while maintaining system closure, each of these design decisions addresses a specific operational concern. Taken together, they improve dosing accuracy, reduce contamination risk, simplify installation, and support routine maintenance by field personnel who may not be specialized engineers.

The technology is particularly relevant in regions where water management has become a central concern for regulators and practitioners alike. California is an instructive example. The state has faced compounding water scarcity pressures from extended drought cycles, population growth, and overallocation of surface water resources. In response, California has enacted a series of water use efficiency mandates, including requirements for the conversion of turf areas in residential and commercial landscapes to drip irrigation systems. Drip irrigation is inherently well suited to fertigation because the same distribution infrastructure that delivers water can simultaneously deliver dissolved nutrients precisely to root zones. Compact, self-contained inline fertigation devices like the one described in this patent are well positioned to serve that operational need within the existing irrigation networks that are now being modified and expanded throughout the state.

The environmental case for precise fertigation also connects directly to established concerns within my own field. Conventional approaches to fertilizer application, whether through broadcast spreading or manual addition to irrigation reservoirs, frequently result in uneven distribution, excess application, and nutrient loading in drainage water and stormwater runoff. Excess nitrogen and phosphorus in surface and groundwater are well-documented contributors to aquatic ecosystem degradation, including eutrophication, algal bloom events, and oxygen depletion in receiving water bodies. Technologies that allow operators to apply dissolved nutrients at controlled and adjustable dosages, tied directly to irrigation cycles, reduce the surplus fertilizer that produces those outcomes. The backflow prevention component of this device also addresses a distinct and significant water quality concern: the protection of potable water supplies from contamination through cross-connection with fertilizer solutions, which is a recognized risk in irrigation systems tied to municipal water lines and a requirement addressed under plumbing and irrigation codes in many jurisdictions.

The engineering framework embodied in this patent also has meaningful potential for broader application across the irrigation and fertigation industry, extending well beyond the residential and commercial landscape contexts most immediately addressed. Fertigation as a practice has been adopted at scale in commercial greenhouse production, orchards, vineyards, and row crop agriculture, where it is recognized as an effective tool for precision nutrient management. However, the equipment used in those contexts is typically large,

capital-intensive, and designed for centralized injection, which makes it poorly suited to the distributed infrastructure characteristic of landscape irrigation, small-scale horticulture, residential gardens, and municipal green space management. The device described in Patent No. 162886 addresses a distinct segment of the market: an inline unit that is compact, self-contained, and directly compatible with standard residential and commercial irrigation hardware without requiring system redesign.

This retrofit compatibility is a practically significant design feature. In established landscapes and managed green spaces, large-scale infrastructure modification is rarely feasible. A device that can be added to an existing pipeline inline, serviced independently of the surrounding system, and replaced without disrupting adjacent infrastructure is more likely to achieve meaningful adoption than one that demands installation by specialized contractors. The threaded connection design and the bypass configuration contribute directly to this quality, and they reflect an understanding of how irrigation systems are actually installed and maintained in the field rather than how they appear in engineering specifications. As the irrigation industry continues to evolve toward efficiency-focused retrofitting of existing systems, devices that are designed for compatibility and ease of integration will occupy an increasingly important role.

Furthermore, as precision agriculture and smart irrigation management systems become more prevalent, there is growing interest in combining physical fertigation hardware with automated control systems that adjust nutrient delivery in response to soil moisture data, plant health indicators, weather inputs, and real-time monitoring. The design architecture of this device, particularly the modular dosing control valve positioned between the check valve and the suction filter, is well suited to adaptation for electronic or automated actuation. That adaptability positions this engineering approach favorably in relation to the direction in which the irrigation and agricultural technology industries are developing, where hardware that can be integrated into data-driven management platforms will have increasing relevance.

The device's design also reflects an understanding of the full operational lifecycle of a system of this type, including filling, use, maintenance, and replacement. The accessible filling neck and cap configuration, the removable and cleanable suction filter with its mesh screen and sealing ring, and the air-permeable lid that prevents vacuum lock during operation all indicate that the inventors gave meaningful attention to the experience of the user over time, not only the initial performance of the system under ideal conditions. That lifecycle perspective is characteristic of engineering that is informed by practical experience in the field.

Although the commercial trajectory of any technology depends on factors beyond engineering design, including manufacturing scale, regulatory review, cost structure, and market adoption, the engineering foundation of this invention is substantive, practically grounded, and aligned with recognized trends in irrigation technology and sustainable resource management.

In my professional assessment, Mr. [redacted] s work in developing this device reflects a level of technical judgment and specialized knowledge that is not typical of routine engineering practice. His ability to identify a specific operational deficiency in existing irrigation and fertigation systems and translate that observation into a multi-component integrated solution demonstrates both fluency with the underlying engineering principles and practical experience with how systems of this type function in the field. His additional role as

co-founder and Chief Technology Officer of [redacted] Nutrition Inc., the entity that holds the patent, reflects a further dimension of professional leadership, combining technical authorship with the organizational and commercial work required to bring an engineering invention toward deployment. In my view, that combination of technical contribution and translational initiative represents the kind of professional achievement that advances a field rather than simply applying established practice within it.

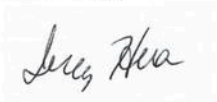
Based on my independent review, I consider this invention to be a technically credible and practically valuable engineering development with meaningful implications for the advancement of irrigation and fertigation technology. It represents, in my professional judgment, a contribution that goes beyond the routine application of known principles and reflects the practical engineering innovation that moves a field forward.

I provide this opinion independently and voluntarily, based solely on my professional expertise and my review of the materials submitted to me. Should additional technical clarification be required, I would be pleased to provide further comment.

This evaluation relies upon copies of documents provided by Mr. [redacted] and represented by Mr. [redacted] to be authentic and true copies of those documents. There are no apparent grounds for me to disbelieve the authenticity and accuracy of the documentation presented to me on behalf of Mr. [redacted] I represent the foregoing to be an accurate and correct evaluation to the best of my knowledge and belief, pursuant to requirements of United States Citizenship and Immigration Services of the United States Department of Homeland Security.

The foregoing evaluation of Mr. [redacted] has been prepared and certified by me this *August 10, 2026*. Because of the positions I have held and hold at the above-mentioned university, I have the opportunity to evaluate the experience, training, and/or courses taken at other U.S. or international universities. The above letter is strictly my opinion and is not the opinion of any of the universities with which I am/was affiliated or any of their departments or affiliates.

Sincerely,



[redacted], Ph.D
Professor, Lyles School of Civil and Construction Engineering, and School of Sustainability Engineering and Environmental Engineering
Purdue University (Main Campus)

For detailed statement of qualifications and experience of evaluator, see attached resume.

(**010022801**)

PURDUE UNIVERSITY

LETTER OF EMPLOYMENT VERIFICATION

April 15, 2026

To Whom It May Concern:

This letter serves as a verification of employment for [redacted] who has been an employee with Purdue University since January 1, 1996.

[redacted] serves as a Prof Civil & Construction in our office in West Lafayette.

Please feel free to contact us if your office should require further information.

Sincerely,

Purdue University

For questions please contact:
Experian Verify
On behalf of Purdue University
404-382-5400

Professional Experience

Full Professor, School of Sustainability Engineering and Environmental Engineering and Lyles School of Civil and Construction Engineering, Purdue University (2007-)

Advisor Engineering, Environmental Sustainability, Office of the Chief Technology Officer, Western Digital, San Jose, CA (2022-)

Associate Director, Global Engineering Programs, Purdue University (2009-2012)

Visiting Scholar, Climate Earth, Inc., San Francisco, CA (2010-2011)

Founding Interim Head, Division of Environmental and Ecological Engineering, College of Engineering, Purdue University (2006-2009)

Associate Professor, Civil Engineering, Purdue University (2001-2007)

Summer Faculty Fellow, NASA/ASEE (summer), NASA Ames Research Center, Mountain View, CA (2003, 2004)

Visiting Staff, U. S. Environmental Protection Agency, Region 9 Headquarters, San Francisco, CA (2002)

Assistant Professor, Civil Engineering, Purdue University (1996-2001)

Graduate Research Assistant, California Institute of Technology, Pasadena, CA (1990-1995)

Student Co-op, The Dow Chemical Company, Pittsburg, CA (1990)

Undergraduate researcher, Department of Chemistry, U.C. Berkeley (1988, 1999)

Student researcher, Lawrence Berkeley Laboratory, Berkeley, CA (1986)

Awards and Honors

- Inducted into The Book of Great Teachers (Purdue University) 2023
- Board Certified Environmental Engineering Member (Specialty: *Environmental Sustainability*), American Academy of Environmental Engineers and Scientists (2022)
- Outstanding Faculty Mentor Award, Purdue University College of Engineering and the Graduate Student Organization of Environmental and Ecological Engineering (2021)

- Societal Impact Fellow (2021) - Purdue University Provost's Office
- Exceptional Teaching and Instructional Support during the COVID-19 Pandemic (2021)
- American Society of Engineering Education, Environmental Engineering Division, Best Paper on Diversity (2020)
- College of Engineering Faculty Excellence Award - Engagement (Individual) (2020)
- Instructional Excellence Award, Purdue Society of Environmental and Ecological Engineering (2019)
- Real-World Learning – Learning Community Award-Engineering for the Planet (2017)
- Purdue School of Engineering Education (ENE) Faculty Scholar (2015-2017; 2019-present)
- IM:PACT Fellowship; Fall 2013
- NASA/ASEE Faculty Fellow (2003, 2004)
- Engineering Foundation Travel Fellowship (1997)
- Pacific Telesis Foundation Grant: Haagen-Smit/Tyler Fellowship (1990-91)

Education

California Institute of Technology (Caltech) Pasadena, CA	Environmental Engineering and Science	PhD	1996
California Institute of Technology (Caltech) Pasadena, CA	Environmental Engineering and Science	MS	1992
University of California, Berkeley, CA	Biochemistry	BA	1990

Selected Research and Educational Innovation Projects

Title	*Conference: DESC: Type III: A Holistic AI Computing Framework: Incorporating the Water and Biodiversity Dimensions of Sustainability*
Sponsor	National Science Foundation
Period	May 2024-April 2025
Amount ($)	99,992
Team	PI: [redacted]; co-PI: Yi Ding

Title	*Collaborative Research: NRT: Next Generation Technology and Talent Driven by Environmental Sustainability*
Sponsor	National Science Foundation
Period	September 2024-August 2027

Amount ($)	1,500,000 (Continuing grant)
Team	PI: [redacted]; co-PIs: [redacted] Cai, Rebecca Ciez, John Howarter, John Mulrow
Notes	Total project budget = $3,000,000 with North Carolina Agricultural and Technological State University (NC A&T)

Title	*Collaborative Research: ECO-CBET: Integrated Biochemical and Physicochemical Process to Recover Critical Metals from Municipal Solid Waste in Landfills*
Sponsor	National Science Foundation
Period	August 2024-July 2028
Amount ($)	915,128
Team	PI: Amisha Shah; co-PIs: [redacted], Caitlin Proctor
Notes	Total project budget = $1,685,694 with Columbia University and Lafayette College

Title	*Center for Dynamic Intelligence in Challenging Environments (DICE)*
Sponsor	Purdue University, College of Engineering
Period	January 2025 – December 2025
Amount ($)	100,000
Team	PI: Christopher Brinton; co-PI: [redacted], David Love, Leifur Leifsson

Title	*Environmental Sustainability Training Program*
Sponsor	Plexus Corporation
Period	August 2023-August 2024
Amount ($)	50,000
Team	PI: [redacted]; co-PIs: John Howarter, John Sutherland, Fu Zhao
Notes	Activities highlighted in Plexus Corporate Sustainability report

Title	*IGERT: Global Traineeship in Sustainable Electronics*
Sponsor	National Science Foundation
Period	2012 - 2019
Amount ($)	3,249,979
Team	PI: Carol Handwerker; co-PIs: [redacted], Ananth Iyer, Karthik Ramani, Melissa Reeves

Title	*Agile Curriculum Reform (ARC) EEE*
Sponsor	Purdue University, College of Engineering
Period	2021-2022
Amount ($)	50,000
Team	PI: [redacted]; co-PIs: John Howarter, Lindsey Payne, Caitlin Proctor, George Zhou

Title	*Research Experience for Teachers (RET) Site: Collaborative Research: Sustainable Electronics*
Sponsor	National Science Foundation
Period	September 2015 – July 2020
Amount ($)	438,582
Team	PI: [redacted]; co-PI: William Oakes
Notes	Total project budget = $586,173 with Tuskegee University

Title	*Virtual Laboratory Experiments (VLE)*
Sponsor	Purdue University, College of Engineering
Period	2021-2022
Amount ($)	10,000
Team	PI: [redacted]

Title	*Course Based Undergraduate Research Experience (CURE)*
Sponsor	Purdue University Office of Undergraduate Research
Period	2021-2022
Amount ($)	3,000
Team	PI: [redacted]

Title	*Circular Hard Disk Drive Magnets Life Cycle Assessment*
Sponsor	Google LLC
Period	2020-2021
Amount ($)	30,000
Team	PI: [redacted]

Title	*Understanding the Industrial Water Consumption for Smart Cities*
Sponsor	Seed Grant (Engineering Faculty Conversation; Purdue College of Engineering).
Period	2019-2020
Amount ($)	75,000
Team	PI: [redacted] Cai; co-PI: [redacted]

Title	*HAMP 2135 Lab Renovation*
Sponsor	Purdue University/Discovery and Learning Laboratory Renovation Program (DL^2)
Period	2013 (renovation complete in 2018)
Amount ($)	1,100,000
Team	PI: [redacted]

Title	*REU Site: Tackling Some of the Grand Challenges of Engineering*
Sponsor	National Science Foundation
Period	2010-2013
Amount ($)	287,232
Team	PI: [redacted]; co-PI: Michael Harris

Title	*Incorporating Sustainability Concepts into the Engineering Curriculum at Purdue*
Sponsor	ENGR 2020 Seed Grant (CoE)
Period	2009-2010
Amount ($)	40,000
Team	PI: Stephen Hoffmann; co-PI: [redacted]

Title	*Engineering Students' Attitudes and Threshold Concepts Towards Sustainability and Engineering as an Environmental Career*
Sponsor	National Science Foundation
Period	2009-2011
Amount ($)	149,998
Team	PI: Johannes Strobel; co-PI: [redacted]

Title	*Students' Attitudes and Threshold Concepts Towards Engineering as an Environmental Career: Research by Participatory Design of an Educational Game*
Sponsor	ENGR 2020 Seed Grant (CoE)
Period	2008-2009
Amount ($)	40,000
Team	PI: Johannes Strobel; co-PI: [redacted]

Title	*Photochemical Fate Of Manufactured Carbon Nanomaterials in the Aquatic Environment*
Sponsor	U.S. Environmental Protection Agency
Period	2007-2009
Amount ($)	199,999
Team	PI: Chad Jafvert; co-PI: [redacted]

Title	*Testing Chemical Oxidation for Destruction of Organic Compounds*
Sponsor	Eli Lilly
Period	2006
Amount ($)	29,948

Team	PI: [redacted]; co-PI: P. Suresh C. Rao

Title	*Sonochemistry*
Sponsor	Campbell Applied Physics
Period	2008
Amount ($)	30,000
Team	PI: [redacted]

Title	*Environmental Photochemistry of Polybrominated Diphenylethers*
Sponsor	U.S. Environmental Protection Agency
Period	2005-2006
Amount ($)	234,586
Team	PI: Chad Jafvert; co-PIs: [redacted], Timothy Filley

Title	*An Investigation of Life-Cycle and Policy Aspects of Brominated Flame Retardants*
Sponsor	National Science Foundation
Period	2005-2008
Amount ($)	412,000 (plus $15, 200 match from Purdue)
Team	PI: [redacted]; co-PIs: Thomas P. Seager, Leigh Raymond

Title	*Innovative Remediation Technology Implementation Plan for the Crawfordsville INDOT ROW Site*
Sponsor	Joint Transportation Research Projects/Indiana Department of Transportation (JTRP/INDOT)
Period	2005-2007
Amount ($)	150,000
Team	PI: [redacted]; co-PIs: P. Suresh C. Rao, Linda S. Lee

Title	*Improved Detection and Remediation of NBC/CBRN/TIC/TIM Contaminants in Potable Water*
Sponsor	Advanced Concepts and Technologies, International
Period	2005-2007
Amount ($)	413,758 (plus $31, 677 match from Purdue)
Team	PI: [redacted]; co-PIs: Chad Jafvert, Ronald Turco

Title	*Ecotoxicology of Brominated Flame Retardants in Great Lakes Biota*
Sponsor	U.S. Environmental Protection Agency
Period	2005-2007
Amount ($)	128,478
Team	PI: [redacted]; co-PIs: T. Sutton, M. Sepulveda, H. Ochoa-Acuna.

Title	*Remediation of Aromatic Hydrocarbons in Low Permeability Soils: Updating the Remediation Decision Tree*
Sponsor	Joint Transportation Research Projects/Indiana Department of Transportation (JTRP/INDOT)
Period	2005-2006
Amount ($)	30,000
Team	PI: [redacted]

Title	*Molecular Weight Reduction of Asphaltenes via Sonochemical Treatment*
Sponsor	The Technology Store, Inc. (TTS, Inc.)
Period	2004
Amount ($)	29,319
Team	PI: [redacted]

Title	*The Future Role of Ecological Engineering Science in Undergraduate Engineering Education*
Sponsor	National Science Foundation
Period	2003-2006
Amount ($)	100,000
Team	PI: Loring Nies co-PIs: [redacted], Julie Ann Stuart Williams, Rabi Mohtar, Marne Helgesen.

Title	*Innovative Technologies for Accelerated Groundwater Clean-up and Remediation Performance Assessment at Contaminated Sites*
Sponsor	Showalter Trust Foundation
Period	2002-2004
Amount ($)	99,952
Team	PI: P.Suresh C. Rao; co-PIs: [redacted], Chad Jafvert, Linda Lee

Title	*Determination of Rate and Degree of Alkaline Solution Neutralization within a Pipe Using Carbon Dioxide Sparging*
Sponsor	Florida International University
Period	2000
Amount ($)	15,436
Team	PI: [redacted]; co-PIs: Loring Nies, Ronald Wukasch

Title	*An Investigation of Ultrasonic Irradiation as an Alternative Disinfection Technology*
Sponsor	Purdue Research Foundation

Period	2000
Amount ($)	12,646
Team	PI: [redacted]

Title	*Brominated Flame Retardants: Environmental Photochemical Reactions of Decabromodiphenylether*
Sponsor	American Chemistry Council
Period	2000-2001
Amount ($)	120,000
Team	PI: Chad Jafvert; co-PI: [redacted]

Title	*Control and Reduction of Water Pollution with Supercritical Fluids*
Sponsor	Showalter Trust Foundation
Period	1999-2000
Amount ($)	50,000
Team	PI: [redacted]

Title	*Ultrasonic Irradiation for Pollution Prevention*
Sponsor	Purdue Research Foundation
Period	1998-2000
Amount ($)	23,200
Team	PI: [redacted]

Title	*Renovation of the Environmental Engineering Analytical Laboratories, and Civil Engineering Rooms 3109, 3104 and 3119*
Sponsor	National Science Foundation
Period	1997-1999
Amount ($)	$446,400 (plus $446,400 match from Purdue University)
Team	PI: Chad Jafvert, Co-PIs: [redacted], Loring F. Nies, James Alleman, Ernest Blatchley

Title	*Decomposition of Hazardous Wastes in Acoustically Cavitating Aqueous Solutions*
Sponsor	Purdue Research Foundation
Period	1996-1998
Amount ($)	22,614
Team	PI: [redacted]

Title	*The Use of Ultrasonic Waves for Water Pollution Control*
Sponsor	Showalter Trust Foundation

Period	1996-1998
Amount ($)	49,856
Team	PI: [redacted]

Title	*An Investigation of Homogeneous and Heterogeneous Sonochemistry*
Sponsor	U.S. Department of Energy
Period	1996-1999
Amount ($)	290,000 (plus $62,000 match from Purdue University)
Team	PI: [redacted]

Publications *(selected)*

Submitted and under review

Taymee A. Brandon, Chad T. Jafvert, Cliff T. Johnston, Wen-Che Hou, [redacted]; "Characterization of natural and synthetic textile-derived biochar from torrefaction to moderate pyrolysis," submitted September 4, 2025 to *Carbon Research.*

Refereed journal articles, conference proceedings, and technical reports

Wu, Yanran, [redacted]; Ding, Yi, "Unveiling Environmental Impacts of Large Language Model Serving: A Functional Unit View," the 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025), July 27 – August 1, 2025, Vienna, Austria.

Yanran Wu, [redacted], Yi Ding; "Not All Water Consumption Is Equal: A Water Stress Weighted Metric for Sustainable Computing," HotCarbon Workshop on Sustainable Computer Systems, July 10-11, 2025, Cambridge, MA.

Tianyao Shi, [redacted], Yi Ding; "When Servers Meet Species: A Fab-to-Grave Lens on Computing's Biodiversity Impact" HotCarbon Workshop on Sustainable Computer Systems, July 10-11, 2025, Cambridge, MA.

Sheida Nili, Sima Nikfar, Ario Fahimi, Mattew Joseph Bih Gozun, [redacted], Ehsan Vahidi; "Exploring the Environmental Impact of Metallic Element Usage in Smartphone Evolution", *Resources, Conservation and Recycling,* Volume 205, June 2024.

Frost, K. and [redacted], I., "Application of a Regionalized Chemical Footprint Method to Identify Aquatic Ecotoxicity Hotspots of HDD Rare Earth Magnets," *Integrated Environmental Assessment and Management* (a SETAC journal), volume 19, no. 1, pp. 272-283, January 2023.

Frost, K., Sousa, I., Larson, J., Jin, H., [redacted], I., "Environmental Impacts of a Circular Recovery Process for Hard Disk Drive Rare Earth Magnets," *Resources, Conservation and Recycling,* 2021-10, vol. 173, p. 105964.

Tantawi, O., [redacted], I., "Temporal evolution of metallic element composition in consumer electronic devices: a study of smart phones," *Resources, Conservation and Recycling*, 2021-12, vol. 175, p.105886.

[redacted] I., Nies, L., Payne, L., "Environmental and Ecological Engineering in Context: A Foundational Graduate Course, Proceedings of the ASEE Annual Exhibition and Conference, June 2020 (virtual).

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[redacted] I., "Short-term Study Abroad: Engineers Gaining Intercultural Competency," paper presented at 2021 ASEE Virtual Annual Conference.

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Dr. [redacted] and her group have helped communicate these findings to a broader, non-scientific audience.

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Teaching and Teaching Innovation (*past 10 years only)*

Dr. [redacted] strives to continuously advance teaching, to enhance student learning outcomes. Selected initiatives are described in this section.

Dr. [redacted] made several very significant contributions to teaching for both EEE and CE, and these developments were funded by the following grants: 1) Agile Reform of Curriculum, 2)Virtual Laboratory Experience, 3) Course Based Undergraduate Research Experiences (CURE), and 4) The Time is Now: Development of a Curriculum Around Social Justice and Equity in Civil Engineering.

Agile Reform of Curriculum (EEE)
This was an effort led by [redacted], John Howarter, Caitlyn Proctor, Lindsey Payne and George Zhou, in collaboration with the Center for Instructional Excellent (Erica Lott). Important tasks included a faculty workshop to discuss reform, piloting of new course material and course structures during the 2021-2022 calendar years, and assessment of pilot material and experiential learning. In addition, a course repository for curriculum sharing was also created. Multiple discussions with the entire EEE faculty and the External Advisory Board (EAB) to gain stakeholder input.

Virtual Laboratory Experience
Dr. [redacted] developed a virtual lab for a high enrollment undergraduate course: CE/EEE 350: Introduction to Environmental and Ecological Engineering. Course provides an overview of the environmental engineering discipline. Required for EEE majors, strongly recommended for CE majors, required for several minor programs, and enrolls a broad cross-section of students from many programs to fulfill technical elective needs. One of the modules in CE/EEE 350 is air quality and management, with an emphasis on engineering controls for point source pollution (e.g., stacks). The purpose of the VLE is a greater understanding of the basic steady-state Gaussian plume equation, and how to integrate the equation into broader considerations of protecting human health and the environment. In the current version of the course, students complete calculations using the Gaussian plume equation. The virtual lab (developed in collaboration with the Center for Instructional Excellence and the Envision Center) integrated

large environmental data sets, GIS tools, and computation and animation, so that students could visualize differences in ground-level air quality resulting from engineering controls and/or weather conditions, for actual emissions locations. The lab will emphasize particulate matter ($PM_{2.5}$ and PM_{10}) and NO_X as criteria air pollutants in the United States. The VLE was deployed CE/EEE during Fall 2021 and Spring 2022 (>200 students impacted). Assessment data has been collected and will be published in the future.

Course Based Undergraduate Research
A CURE experience increases accessibility to research and ultimately broadens the pipeline to the scholarly community. Dr. [redacted] developed and implemented a CURES course (EEE 380, 60+ students). All students in the course participated in a research project about urban heat islands. This topic was aligned with the overall topic of the course: mass and energy balances for environmental engineers. Pre- and post-CURES assessments were conducted. Dr. [redacted] completed formal training to develop the CUREs, and was a member of the CURES Community of Practice. The Office of Undergraduate Research oversees the CURE program at Purdue.

Social Justice and Equity in Civil Engineering
Dr. [redacted] was co-PI on a grant (lead PI: Marika Santagata, co-PI: David Yu) to include social justice and equity in the CE curriculum. The project objectives are to: 1) Identify potential avenues for inclusion of social justice concepts in the undergraduate and graduate curriculum; 2) Assemble a body of knowledge with examples of CE endeavors and their socio-economic consequences from a social justice and equality perspective that are framed from multi-disciplinary perspectives (e.g. sociology, economics); 3)Identify potential avenues for inclusion of social justice concepts in the undergraduate and graduate curriculum; 3)Provide recommendations on the pedagogy of the delivery mechanism; 4) Formulate preliminary content for a pilot. The project is currently underway, with pilot material scheduled for Spring 2023.

Dr. [redacted] has contributed to the Affordable Online Masters Degree in Civil Engineering by developing and teaching a completely on-line, asynchronous 3 credit graduate course, "Water Chemistry for Environmental and Ecological Engineering."

The entire year of teaching was significantly impacted by the global pandemic. Dr. [redacted] adapted her teaching methods to maximize student learning in various modes of course delivery.

During July 2020, Dr. participated in the IMPACT-X program to re-design CE/EEE 350 course for Fall 2020. These re-design strategies were also incorporated into CE 597. Strategies included virtual, synchronous (Zoom, Webex) class meetings, re-organizing, re-writing and developing assignments for each class, and asynchronous (BoilerCast) modes of delivery. Re-configured classrooms and spaces were barriers to active learning pedagogy.

As a member of the ENGR 131 teaching team, Dr. [redacted] attends weekly meetings to provide input into the ENGR 131 curriculum, which has an indirect impacts all students in the course (~1800-2000 per year) Dr [redacted]a provides technical expertise and input about course content, activities, and assignments, and in 2020, developed an engineering design project (8 week assignment) for her section. During Fall 2020, ENGR 131 was entirely virtual. All class meetings were

conducted via Zoom. Dr. [redacted] adapted new technological skills and strategies to interact with students.

Dr. [redacted] was selected to participate in the Intercultural Pedagogy Grant (IPG) program and during Fall 2020, completed an intensive course of training (8 weeks) to enable development of *virtual* intercultural experiences.

Dr. [redacted]'s has provided international opportunities to students, and conducted a formal evaluation to measure the effectiveness of those programs. Dr. [redacted] won an Intercultural Pedagogy Grant to assess the Study Abroad course: Sustainability Across Sectors-Sweden. When the program was offered in 2015 and 2017, assessment of student experiences was based on homework assignments and student reflection, informal discussion with the students, and course evaluation scores. The assessments for these two years did not specifically focus on intercultural competency. For the 2019 program, the program leader completed a training program on assessing intercultural competency during the semester preceding the course. Assessment of each student's intercultural competency included a pre-program and post-program completion of the Intercultural Development Inventory (IDI), rubric-based evaluation of written homework assignments, observations of students while abroad, and guided, small-group reflections about cultural experiences in Sweden and the U.S.

Over 50% of the students demonstrated increasing intercultural competency (reflected by increasing scores on the IDI). This is a significant result, given that the time abroad was relatively short (approximately two weeks). The rubric-based assessment was founded on the Association of American Colleges and Universities (AACU) Intercultural Knowledge and Learning Valid Assessment of Learning in Undergraduate Education (VALUE) Rubric. In particular, assessment was focused on students' cultural self-awareness and curiosity, and the outcomes are more qualitative. Students demonstrated greater curiosity (about other cultures, including Swedish) than they did cultural self-awareness.

The Study Abroad course, entitled "Sustainability Across Sectors-Sweden" was delivered in May 2015, May 2017 and May 2019. This course was delivered to CE and EEE students as a technical elective or selective, as approved by each unit's undergraduate committee. The course related theoretical concepts to experiential learning, and included
tours and visits with faculty at KTH, The Royal Institute of Technology, in Stockholm, Sweden. Numerous technical visits were also in the schedule, including:
+Skanska Head Office (Stockholm)
+E.ON, a global energy provider
+The Swedish Environmental Protection Agency
+Hammarby Sjöstadsverk (a pilot scale wastewater treatment facility)
+The Arlanda Airport/Swedavia (plane side tour and discussion of their many sustainability related technologies and initiatives)
+Käppala wastewater treatment plant (a full-scale wastewater treatment plant contained entirely in a rock cavern)
The students also visited Hammarby Sjöstad, an entire district of Stockholm designed with sustainable infrastructure, and other locations/institutions.

At KTH, students met with researchers who discussed sustainable transportation (buses), mining the oceans for resources, sustainable production processes, and climate change. The course enrolled students from CE and EEE. This course was the very first short term Study Abroad course available to EEE majors.

Continuing the appointment begun during Fall 2015, Dr. [redacted] was an ENE faculty scholar, by invitation from the School of Engineering Education, and with approval from the School of Civil Engineering and the Division of Environmental and Ecological Engineering for 2016. In this role, Dr. [redacted] taught ENGR 131 (Ideas to Innovation I) and ENGR 103 (Introduction to Engineering in Practice), as part of the FYE Learning Community: Engineering for the Planet. These courses introduce first year engineering students to the College of Engineering. ENGR 103 emphasizes environmental sustainability in the context of professional development. The Learning Community is for all engineering students about the role of engineering in environmental sustainability, and each year, a broad cross-section of intended majors enrolls in the LC. The LC also includes a number of co-curricular events, such as field trips and on-campus activities.

Dr. [redacted] developed and offered a new graduate level course exploring water quality and quantity issues in an industrial context. The course was offered for the first time during Spring 2017, with the title: Global Industrial Water Use: Quality and Quantity (CE 597).

As co-Director of Education for an IGERT program, Dr. [redacted] has developed and co-taught doctoral level courses on the topic of sustainable electronics. These courses have been offered simultaneously to both Purdue and Tuskeegee IGERT fellows. As co-Director of Education, she will oversee the development and implementation of a Graduate Certificate in Sustainable Electronics, and will contribute to the doctoral training of at least 25 Purdue PhD students over a 5 year period (2012-2017). The IGERT courses and student advising are highly interdisciplinary, and have integrated faculty expertise from engineering, management, political science, chemistry and from many industrial partners.

Courses taught (*past 10 years only*)

Year	Term	Title	Enrollment
2025	Fall	Engineering Research Fundamentals	10
2025	Fall	Water Chemistry for Environmental and Ecological Engineers	40
2025	Summer	Introduction to Environmental and Ecological Engineering	38
2025	Spring	Environmental Chemodynamics	33
2025	Spring	Sustainability Metrics for Semiconductors	11
2024	Spring	Environmental Chemodynamics	52
2024	Fall	Water Chemistry for Environmental and Ecological Engineers	15
2023	Fall	Introduction to Environmental and Ecological Engineering	97

2022	Spring	Industrial Water Consumption	28
2022	Spring	Environmental Chemodynamics	64
2022	Spring	Water Chemistry for Environmental and Ecological Engineers	22
2021	Spring	Environmental Chemodynamics	59
2021	Fall	Introduction to Environmental and Ecological Engineering	89
2021	Fall	Ideas to Innovation I	117
2020	Spring	Environmental Chemodynamics	56
2020	Spring	EEE in Context: Global Industrial Water Consumption	27
2020	Fall	Ideas to Innovation 1	98
2020	Fall	Introduction to Environmental and Ecological Engineering	75
2020	Fall	Water Chemistry for Environmental and Ecological Engineers	10
2019	Spring	Environmental Chemodynamics	41
2019	Spring	Sustainability Across Sectors-Sweden (on-campus module)	18
2019	Summer	Sustainability Across Sectors-Sweden (travel)	18
2019	Fall	Ideas to Innovation I	109
2019	Fall	Introduction to Environmental and Ecological Engineering	80
2019	Fall	Water Chemistry for Environmental and Ecological Engineers	15
2018	Spring	Environmental Chemodynamics	42
2018	Spring	Recovering Value from Solid Waste: Biological and Chemical Approaches	27
2018	Fall	Introduction to Environmental and Ecological Engineering	87
2018	Fall	Water Chemistry for Environmental and Ecological Engineers	22
2017	Spring	Recovering Value from Solid Waste: Biological and Chemical Approaches	22
2017	Spring	Global Industrial Water Use: Quality and Quantity	13
2017	Summer	Sustainability Across Sectors: Sweden	20
2017	Fall	Introduction to Environmental and Ecological Engineering	85
2017	Fall	Water Chemistry for Environmental and Ecological Engineers	19
2016	Spring	Water Chemistry for Environmental and Ecological Engineers	13
2016	Spring	Recovering Value from Solid Waste: Biological and Chemical Approaches	17

2016	Fall	Introduction to Environmental and Ecological Engineering	81
2016	Fall	Transforming Ideas to Innovation I	105
2016	Fall	Introduction to Engineering in Practice	91
2015	Spring	Water Chemistry for Environmental and Ecological Engineers	19
2015	Summer	Sustainability Across Sectors: Sweden SA 10505	17
2015	Fall	Introduction to Environmental and Ecological Engineering	61
2015	Fall	Ideas to Innovation I	97
2015	Fall	Introduction to Engineering in Practice	97

Practitioner training

Dr. [redacted] was a keynote speaker at a workshop organized by the Integral Management of Solid Waste at the University of Applied and Environmental Science (UDCA) in Colombia. The conference included almost 100 participants from academic, companies, and municipalities in Latin America. September 2023.

Dr. [redacted] collaborated with J. Howarter, J. Sutherland, and F. Zhao to develop a short course for Plexus Corporation entitled "Environmental Sustainability Training Program. This short course served ~25 practicing engineers, involved with product realization, and helped strengthen American manufacturing. The training and partnership were highlighted in the Plexus Corporate Sustainability 2023 report.

As *co-Director of Education for an IGERT program* (2012-2019), Dr. [redacted] has developed and co-taught doctoral level courses on the topic of sustainable electronics. These courses have been offered simultaneously to both Purdue and Tuskegee IGERT PhD fellows (~30 total). The IGERT courses and student advising are highly interdisciplinary, and have integrated faculty expertise from engineering, management, political science, chemistry and from many industrial partners.