CISTAR™

NSF Engineering Research Center

Center for Innovative and Strategic Transformation of Alkane Resources

A National Science Foundation
Engineering Research Center
ESTABLISHED 2017

INDUSTRIAL MEMBERSHIP PROGRAM

PARTNERS IN REVITALIZING THE U.S. PETROCHEMICAL AND FUELS INDUSTRIES:

Creating transformative engineered systems to convert light hydrocarbons into lower carbon footprint chemicals and transportation fuels, by exploring decarbonization of manufacturing processes, modular design, and electrification based on renewable energy sources.

https://cistar.us

PURDUE UNIVERSITY · THE UNIVERSITY OF NEW MEXICO · Northwestern University · UNIVERSITY OF NOTRE DAME · TEXAS The University of Texas at Austin · NSF

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ERC OVERVIEW

The Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR™) is one of the flagship Engineering Research Centers (ERC) of the National Science Foundation. ERCs bring together industry, academia, and government to cultivate engineering discovery and education in research areas critical to our nation's strength. ERCs have an infrastructure that integrates four pillars: **research, workforce development, innovation ecosystem, and impact**, with industry partners being paramount to center success. CISTAR is a coalition of five collaborating institutions comprising of Purdue University, the University of New Mexico, Northwestern University, the University of Notre Dame, and The University of Texas at Austin.

LIGHT HYDROCARBONS LANDSCAPE

The last decade has witnessed an unprecedented revolution in the domestic supply of shale hydrocarbon reserves with the potential to lower the cost and carbon footprint of our nation's electricity, power, chemicals, and fuels. By integrating this transformation with efforts in decarbonization and electrification there is the prospect of transitioning the world to a more sustainable future, presenting a major technical challenge and opportunity for innovations in research and engineering.

CISTAR OPPORTUNITY

Key techno-economic opportunities include expanding the use of natural gas as a feedstock in chemical processes while realizing economic gains alongside reduced environmental impacts through innovations in catalysis, separations, and process enhancements as well as electrification and decarbonization. CISTAR researchers and educators will help accelerate the transition by working to achieve new, broadly disseminated, and impactful science for energy and fuels technology from shale gas hydrocarbons; generating intellectual property to support commercialization of new technologies; demonstrating a combined experimental-computational approach to materials discovery that can be applied beyond hydrocarbon research; providing leading-edge analysis of important environmental issues associated with shale gas upgrading; developing a well-trained workforce of innovative students with technical and professional skills; and informing the public about safe and environmentally responsible ways to use U.S. hydrocarbon resources.

CISTAR'S EDUCATION & INCLUSION GOALS

CISTAR's Engineering Workforce Development (EWD) and Access and Societal Impacts (ASI) goal is to create a technically excellent and collaborative community of hydrocarbon systems researchers, learners, and teachers through competency-based education, best-practice mentoring, and growth in key professional skills.

CISTAR'S INDUSTRIAL MEMBERSHIP PROGRAM

Leverages NSF funding with an industry membership fee that enables strategic advice from industry and helps accelerate R&D progress and technology transfer.

THE OUTCOMES WILL BE:

- Innovative technologies for enhanced conversion of light hydrocarbons combined with novel separations and systems engineering design
- Potential reduction in greenhouse gases through decreased flaring, lower energy requirements, and decarbonization based on renewable electrification
- Long-term relationships with companies, partners, and national labs engaged in processing, transporting, and transforming alkane resources
- Highly-educated graduates with state-of-the-art knowhow and an eagerness to change the world

CISTAR INDUSTRIAL MEMBERSHIP PROGRAM OVERVIEW

DESCRIPTION

	Silver Members	Gold Members
Large Entities (500 or more employees)	USD $30,000	USD $60,000
Medium Entities (10 or more employees, but less than 500)	USD $15,000	USD $30,000
Small Entities (less than 10 employees)	USD $5,000	USD $10,000
Startup Entities (less than $1M funding)	USD $500	USD $1,000

MEMBERSHIP BENEFIT

	Silver Members	Gold Members
Intellectual Property (IP): Access to CISTAR novel catalytic and separation breakthroughs and innovations in chemical reactor designs with right to recommend IP filings.		◉
Licensing: Priority notification of IP filings. Exclusive rights to review claims. First option to negotiate a commercial use license. Final rights as "most favored licensee."		◉
Confidential Information: Right to request confidential information (requires NDA) on CISTAR research, technology, and inventions for internal research and evaluation purposes.	◉	◉
Advisory Board: Exclusive seat on the CISTAR Industrial Advisory Board (IAB) and invitation to attend biannual meetings and interact with CISTAR leadership team, as well as NSF representatives. Gold Members get an additional seat in IP Oversight Board (IPOB).	◉	◉
Research Sponsorship: Sponsor individual research programs outside the CISTAR Core, in areas related but not overlapping with the research funded by NSF, university cost-share, and industry membership fees. Submit joint proposals to other federal sponsors.	◉	◉
Research Findings: Exclusive access to CISTAR research findings, insider knowledge, and industry trends for R&D technology transfer, policy, and environmental aspects through biannual meetings, webinars, and quarterly newsletters.	◉	◉
Networking: Access to CISTAR experts in catalysis, separations, reactor design, and engineering economic analysis; professional interactions with a wide range of academia and industry leaders, and companies from the entire alkane transformation value chain.	◉	◉
Recruiting: Preferential access to talented and highly-trained undergraduates, graduate students, and post-doctoral researchers.	◉	◉
Promoting: High visibility branding with all CISTAR university partners, NSF, and other affiliated professional organizations.	◉	◉
Education: Contribute to the education programs and workforce development of new generations of engineers through internships, seminars, speakers, and mentorship.	◉	◉

CISTAR LEADERSHIP

FABIO RIBEIRO
Director, Site Lead - Purdue University

LINDA BROADBELT
Co-Deputy Director, Site Lead - Northwestern University

RUILAN GUO
Co-Deputy Director - University of Notre Dame

ABHAYA DATYE
International Programs Director, Site Lead, University of New Mexico

WILLIAM SCHNEIDER
Site Lead - University of Notre Dame

DAVID ALLEN
Site Lead - University of Texas at Austin

JASON HICKS
Thrust 1 Leader - University of Notre Dame

RAJAMANI GOUNDER, *Thrust 2 Leader*
Purdue University

TOBIN MARKS, *Thrust 3 Leader*
Northwestern University

RAKESH AGRAWAL, *Thrust 4 Leader*
Purdue University

RUILAN GUO, *Thrust 6 Leader*
University of Notre Dame

JENNIFER DUNN, *Thrust 7 Leader*
Northwestern University

JUSTIN NOTESTEIN, *Technology Modules*
Northwestern University

MAEVE DRUMMOND OAKES, *Engineering Workforce Development Director, Purdue University*

MICHAEL HARRIS, *Engineering Workforce Development Co-Director, Purdue University*

DENISE DRISCOLL, *Director of Access and Societal Impacts, Purdue University*

ELSA CASTILLO, *Co-Director of Access and Societal Impacts, University of New Mexico*

BRITTANY BRIGHT, *Managing Director*
Purdue University

PETER KEELING, *Industry and Innovation Director, Purdue University*

BRUCE COOK, *Industry Advisor*
Purdue University

GARY SAWYER, *Industry Advisor*
Purdue University

TED CALVERLY, *Industry Advisor*
Purdue University

CISTAR'S VISION

To create transformative engineered systems to convert light hydrocarbons into lower carbon footprint chemicals and transportation fuels, by exploring decarbonization of manufacturing processes, modular design, and electrification based on renewable energy sources.

VALUE PROPOSITION

To work in partnership with industry, partners, and national labs to develop technological innovations and an innovative workforce to expand the use of natural gas as a feedstock in chemical processes while realizing economic gains alongside a reduced carbon footprint through innovation in catalysis separations and process enhancements.

TECHNOLOGY READINESS

RESEARCH (TRL 1-4)	**CISTAR** will conduct basic science on how to develop catalysts capable of converting alkanes as well as separation knowhow that leads to the potential for integration and development.
DEVELOPMENT (TRL 4-6)	**CISTAR & INDUSTRY** will collaborate to develop what is learned through research, leading to insights into how to build an integrated pilot system that might be fully derisked leading to a design-build concept that might be implemented at pre-commercial scale.
IMPLEMENTATION (TRL 6-9)	**INDUSTRY** is expected to implement what is learned through development to construct and engineer processes and systems at semi-works scale that leads to full implementation at commercial scale.

FUNDING

CISTAR is one of the flagship Engineering Research Centers currently funded by the National Science Foundation. Combined with additional support from the academic partners and industry membership fees, the annual funding is in excess of $5M. Significant and strategic industrial support is still needed to accelerate R&D progress and technology transfer to industry.

For more information or to become a member, contact:
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CISTAR is dedicated to creating an environment that welcomes, respects, and supports people from all backgrounds.