

Developing Value-added Additives from Pacific Northwest Agro and Forestry Residues for Climate-smart Winter Mobility

Recipient/Grant (Contract) Number: 69A3552348310

Center Name: Pacific Northwest Transportation Consortium (PacTrans)

Research Priority: Improving the Mobility of People and Goods

Principal Investigator(s): Xianming Shi (WSU), Armando McDonald (UI), Subhabrata Dev (UAA)

Project Partners: None

Research Project Funding: \$195,000 federal; \$195,000 non-federal match

Project Start and End Date: 8/16/2023 – 8/15/2025

Project Description: This project aims to accelerate the adoption of bio-based additives in winter road maintenance (WRM) operations, and divert regionally available agro and forestry wastes to this value-added application. Agro and forestry residues from the Pacific Northwest can be employed as a rich source of active anti-icing ingredients and benefit the environment by partially replacing environmentally detrimental chloride salts. Additional benefits can be obtained through their reduced corrosion to metals and reduced damage to concrete and asphalt infrastructure.

This proposed work fits well under the PacTrans thrusts of “Safety, reliability, and resiliency”, and “Developing transformative solutions”. The results allow the Washington State Department of Transportation (WSDOT), Idaho Transportation Department (ITD), and other roadway agencies in the region to better understand how green anti-icers can be applied to WRM operations by maximizing the benefits of chemical products while minimizing their drawbacks. This provides better decision-making and proactive practices concerning creating safe, reliable, and resilient roadways for the transport of people and goods during winter weather.

US DOT Priorities: This project will contribute to the USDOT priority and RD&T strategic goal of **Safety**, by providing innovative bio-based additives for winter road maintenance (WRM) operations. The project will also contribute to the goal of **Economic Strength and Global Competitiveness**, by diverting locally available agro and forestry residues from waste stream to value-added products and by facilitating reliable and resilient transportation network in cold climates. The project will also contribute to the goal of **Climate and Sustainability**, because the beneficial use of agro and forestry residues will help reduce their greenhouse gas emissions and environmental risks. The project will contribute to the goal of **Transformation**, because the developed technology will enable a circular economy through innovations in biotechnology and transportation research.

Outputs: This project will produce at least one paper for presentation at the Transportation Research Board (TRB) annual meeting, at least one publication in peer-reviewed journal, and possibly a patent application. We also anticipate possible development of new partnerships outside PacTrans, such as one with USDA or the U.S. Endowment for Forestry and Communities.

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Outcomes/Impacts: The research findings from this project will be widely disseminated. The PI will deliver a presentation at the PacTrans annual meeting and deliver one webinar on behalf of PacTrans to the broader audience. Upon completion of this project, the team will continue to work closely with municipalities and State DOTs to identify opportunities to further improve the renewable bio-based additives developed in this project. The Intellectual Property (IP) developed will likely be patented and then licensed to a company, which will advance the commercialization and market penetration of more sustainable anti-icing liquids and improve the percentage of roadways treated by sustainable WRM products.

Final Research Report: *will provide upon completion of the project*