

Sustainable Tire Production: Catalytic Upgrading of Ethanol into Butadiene

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Bridgestone aims to minimize resource depletion and greenhouse gas (GHG) emissions by using 100% sustainable materials by 2050. As part of this goal Bridgestone is working to develop a first-of-kind end-of-life recycling process for tire material circularity and the decarbonization of new tire production. Used tires can be gasified to produce intermediate syngas ($H_2 + CO$) that can be further converted into ethanol using mature technology. The ethanol can then be converted into butadiene, a key precursor of new tires, using patented PNNL technology, enabling circularity for end-of-life tires. Indeed, PNNL has developed a new patented thermocatalytic-based technology for the conversion of ethanol into butadiene that allows for high carbon efficiency and improved catalyst longevity compared to World War II baseline catalyst. The objective here is to continue the development of this processing with the goal of commercial deployment. This includes development of engineered catalysts (e.g., extrudates) and their evaluation under industrially relevant conditions coupled with technoeconomic analysis and life cycle assessment as well as FEL-3 study for deployment of a pilot scale. If successful, Bridgestone will subsequently utilize this catalyst technology at pilot and then commercialization scale creating jobs in both construction sector and industry sector in a chosen location that promotes greater diversity, equity, and inclusion through key policies, training, and recruiting practices. Taken together, this work will support the U.S. Department of Energy goal for production of renewable chemicals with > 70% GHG emissions reduction relative to petroleum-derived counterparts and supporting > 1 MMT/yr CO_2e emissions reduction by 2030.