2014 Wyoming Award Winners:

May 9, 2014	**WyoComp** Heath Van Eaton 307.432.4073 Cheyenne, WY 82001	High Value Chemical Commodities Derived from Agricultural Biomasses	NSF

Abstract:
The objective of WyoComp's SBIR-NSF Phase I project is to identify optimal process conditions and catalysts capable of maximizing the value extracted from agricultural wastes like wheat straw, corn stalks, and milo stalks and to assess commercial feasibility by performing costing analyses. Preliminary findings and initial research on wheat straw show that high value chemicals such as p-xylene, styrene, phenol and others can be generated cost effectively from this agricultural waste material. During Phase I, we plan to explore pyrolysis (thermal and catalytic, slow and fast) and will conduct research on material handling and feeding systems based on issues encountered during preliminary work. The proposed costing analysis will determine whether the chemicals can be produced at a cost sufficient to support the commercial production and provide returns on investment. Several factors drive the feasibility of using agricultural waste byproducts to generate high value chemicals; these include renewability and sustainability, costs, environmental impacts, extent of reduction in dependence on fossil fuels and resources, and secondary income creation for agricultural producers. WyoComp has identified markets for chemicals to be generated and the proposal is supported by a letter of interest from a chemicals distributor.

This Small Business Innovation Research Phase I project focuses on the generation of high value chemical commodities from agricultural biomasses. The Prinicipal Investigator for the this SBIR project, Heath Van Eaton, has about 20 years of experience in the polymer, chemical, and composites industry and has not seen duplicative work in either the academic or private sectors. A sustainable bio-based products strategy should utilize widely available biomass feedstock such as annually renewable agricultural biomasses and byproducts, ultimately, lignocellulosic biomass. Processing of lignocellulose is not straightforward, however. There are unmet challenges in optimization of reactor setups and operating conditions and choice of catalysts and a lack of understanding of the effects of the numerous species comprising biomass. Approaches for the valorization of biomass include pyrolysis, gasification, biodiesel formation, thermochemical treatment for the production of chemical and commodities (e.g., hydrolysis and wet processes). The selection of the "best" process for each feedstock depends heavily on the properties of the feedstock itself (e.g., hydrogen, water, inorganic, sulfur, and N2 content), and the maturity and economics of the treatment process. This SBIR research project will address these issues with a focus on using sustainable biomass materials generated from existing WyoComp input agricultural markets.