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U.S. Department of
Agriculture
National Institute of
Food & Agriculture



Project Title: Low Temperature Plasma Gasification to Utilize Diverse Carbonaceous Feedstocks

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Project Goal

The overall goal of this research is to incorporate a low temperature non-thermal plasma to the conventional gasification system to either significantly reduce or completely eliminate tars.

The specific objectives of this study are as follows:

1. Modify UC-Merced's laboratory-scale non-thermal plasma gasification system to investigate tar removal through ionizing model tar compounds.
2. Optimize the effects of power supply (voltage, current, and duty cycle) and tar loading on effectiveness of non-thermal plasma reactor to minimize tars and improve syngas quality.
3. Incorporate non-thermal plasma electrodes (<1 kW) at the outlet of OSU's downdraft gasifier unit.
4. Investigate the effects of and optimize plasma power supply and downdraft gasification equivalence ratio on syngas tar, and overall energy balance.

Expected Outcomes

- The results of this study will add key information and improve the presently available plasma gasification process utilizing woody biomass and agricultural wastes. In addition, this study will result in either very low tar in syngas or tar-free syngas, which will either completely remove the downstream syngas cleaning system or significantly reduced its size and to develop a patent on the low-temperature gasification cum plasma hybrid technology by the end of the project.
- The novel knowledge to be generated under this project will be used to improve the renewable energy courses at the University of California, Merced and Oklahoma State University.



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