# Improving Forest Management: Steam Hydrogasification of Hazardous Woody Fuel for Energy and Resource Recovery

*Zhongzhe Liu[1], Marco Ceja[2], Rosely Ayala[2], Robert Lozano[2], Kayla Berna[2], Serina Ishida[2], Sandra Arenas[2]*

[1]Assistant Professor of Engineering, Department of Physics and Engineering
[2]Undergraduate Researcher, Department of Physics and Engineering
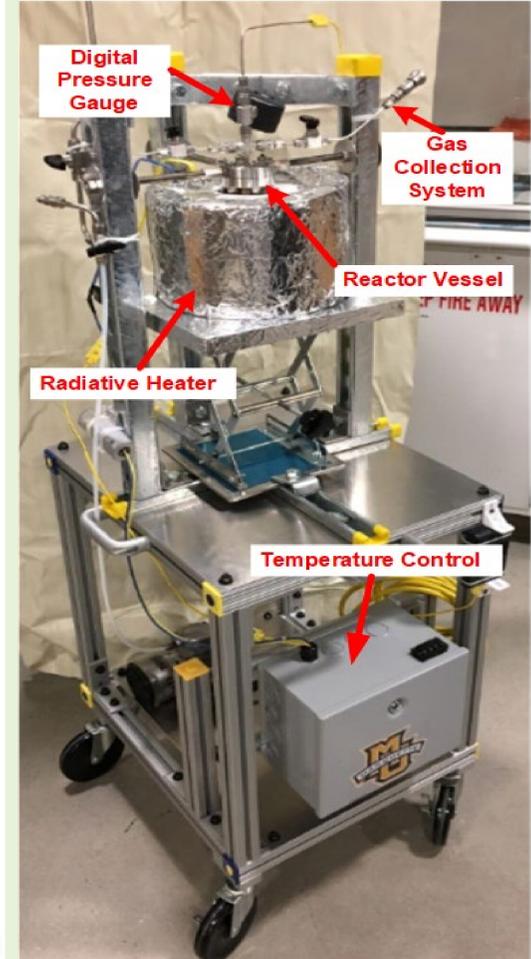
## Research Background

Forestry states such as California have a fire-prone natural system during the wildfire season. These states need to manage their natural systems wisely for public safety and environmental benefit. Tree trimming and man-made firebreak (i.e. fuel break) are efficient methods to slow or stop the progress of a wildfire. However, a large amount of woody biomass (remnants from forest treatments including both trees and woody plants) is generated from these forest management activities. Woody biomass is not utilized effectively as a renewable source because it is usually landfilled. Hence, a sustainable solution to improving forest management is demanded.

Steam hydrogasification reaction (SHR) is a patented high-efficiency and self-sustainable thermochemical technology that can convert carbonaceous materials into renewable energy and fuels. In this project, the SHR technology will be used to convert hazardous woody fuel to methane-rich synthesis gas, which can be further upgraded to synthetic natural gas or other renewable fuels.
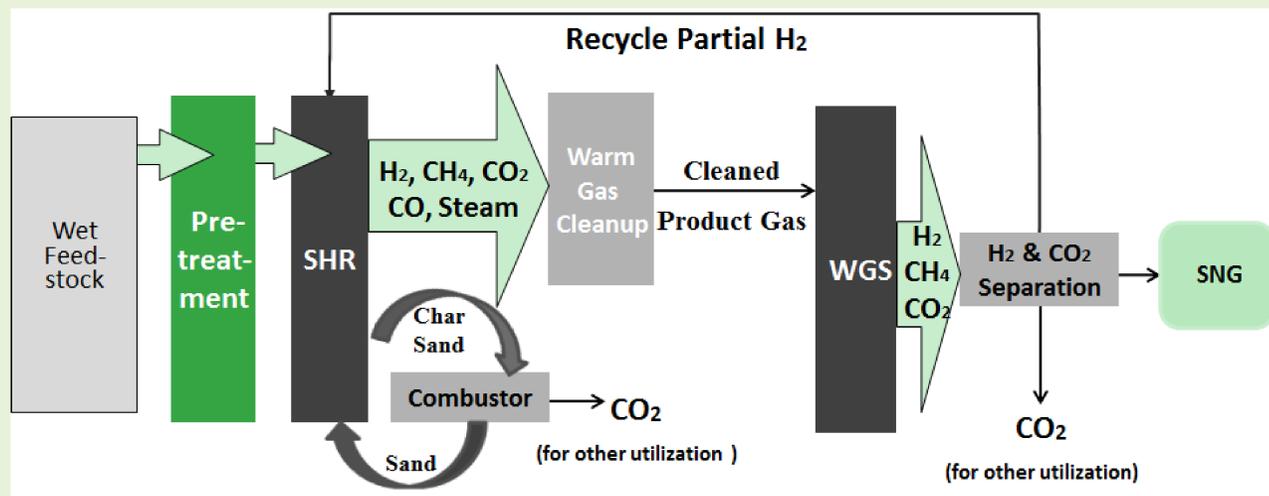
### Steam Hydrogasification Based Process for Synthetic Natural Gas Production



## Experimental Setup
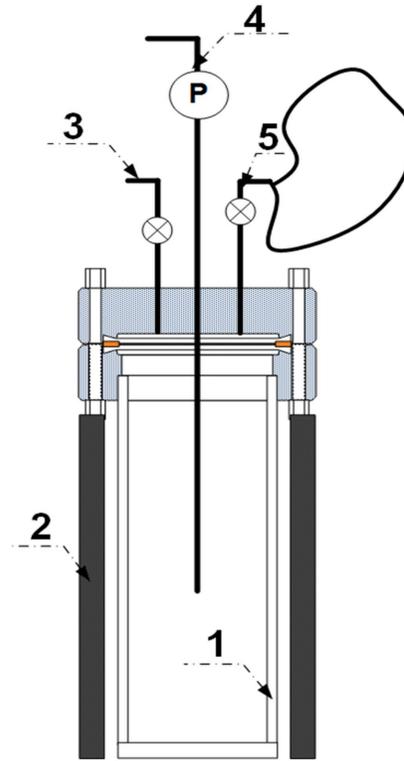


1. Reactor vessel
2. Radiative heater
3. Gas purge and release system
4. Thermocouple and pressure gauge
5. Gas collection system with Tedlar® bag

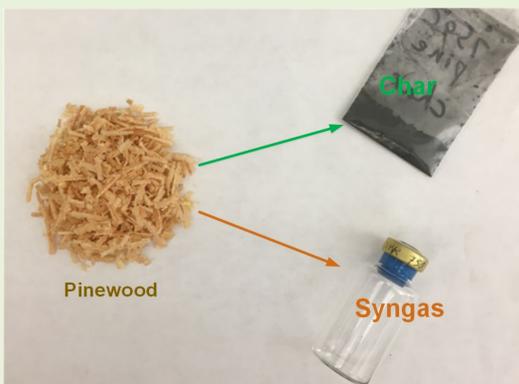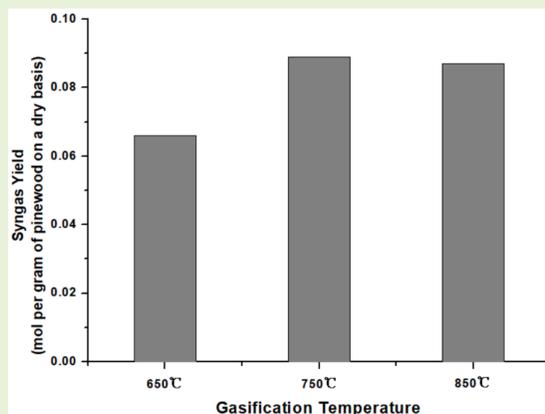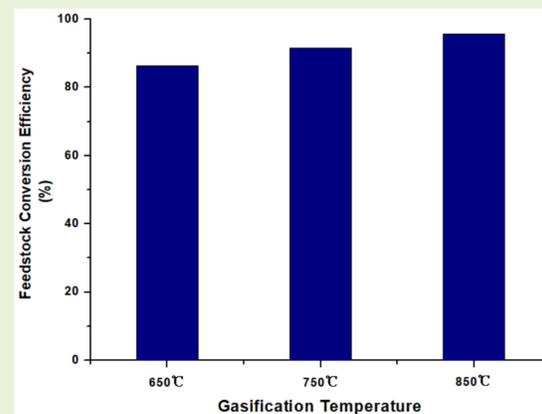## Preliminary Results

### Pinewood is converted to char and syngas



### Gasification temperature increases syngas yield



### Feedstock conversion efficiency is high



## Fun in the Lab



## Acknowledgements