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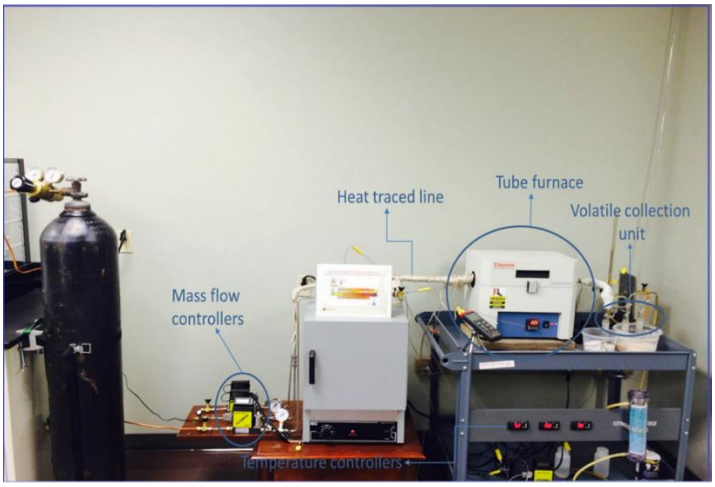
Renewable Energy

Research Summary: Environmental issues, energy security, and economic benefits have prompted nations worldwide to encourage use of alternative energy sources. The United States has been actively promoting the utilization of alternative energy sources by introducing several policies and legislations such as, "the Energy Independence and Security Act of 2007", "Energy Policy Act of 2005", "Renewable Fuels Standards", "Renewable Portfolio Standards", Billion Ton Bioeconomy Initiative, etc. Biomass is one such alternative energy source and has a promising potential to replace fossil fuels to an extent. In addition, carbonaceous waste has an enormous potential as well, effective utilization of which addresses both energy and environmental concerns. My primary research focus is on thermochemical conversion of biomass and carbonaceous waste materials to energy, fuels and chemicals, specifically addressing technology barriers/issues/obstacles preventing commercialization of biomass gasification and thermal pretreatment technologies (torrefaction).

Ongoing Projects: Several projects are currently being implemented in collaboration with several industries including CerX Filters, American Biocarbon, and Teal Seals, Inc., geared towards commercialization of torrefaction and gasification technologies. One of the projects in collaboration with CerX filters include development of novel ceramic catalytic filter that will remove both tars and particulates from biomass syngas in an effective and economic fashion, that potentially will address one of the major hurdles preventing commercialization of gasification technology.

Second project involves evaluation of process operational parameters on production of densified bio-coal from bagasse, using reactors at all scales; bench, pilot (10 kg/hr) and demonstration (2 tons/hr) in collaboration with American Biocarbon. In addition, this project aims at evaluating critical design data (such as heats of torrefaction).



Future Research: Future research goals will complement technology advancement in the area of energy/fuels production from renewable energy sources, specifically biomass/waste geared towards sustainable energy development. Any technology advancement in this area will ultimately lead to improvement in commercial viability of bio-based energy technologies.