



Synergistic Treatment of Dairy-Derived Waste Streams for Energy and Resource Recovery



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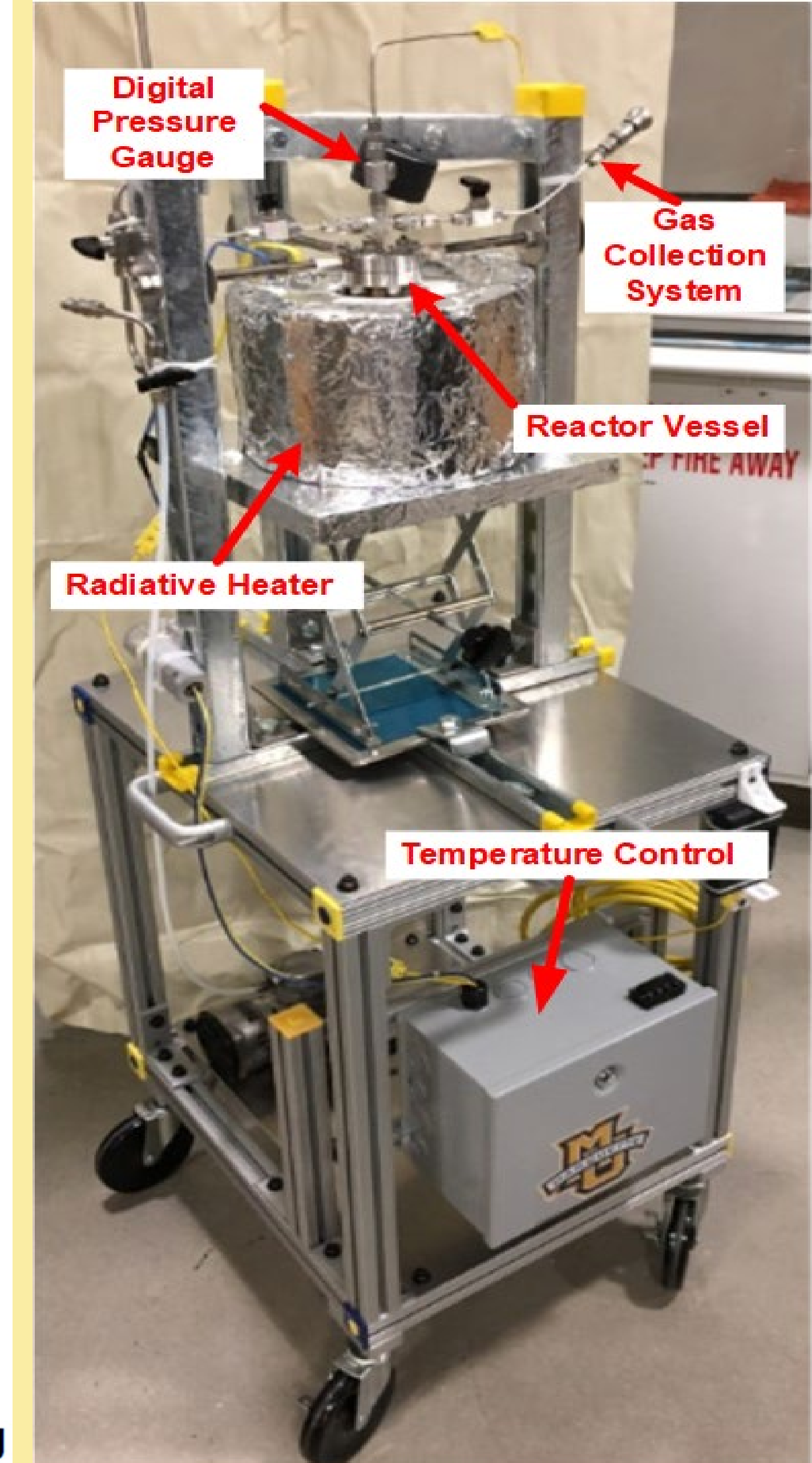
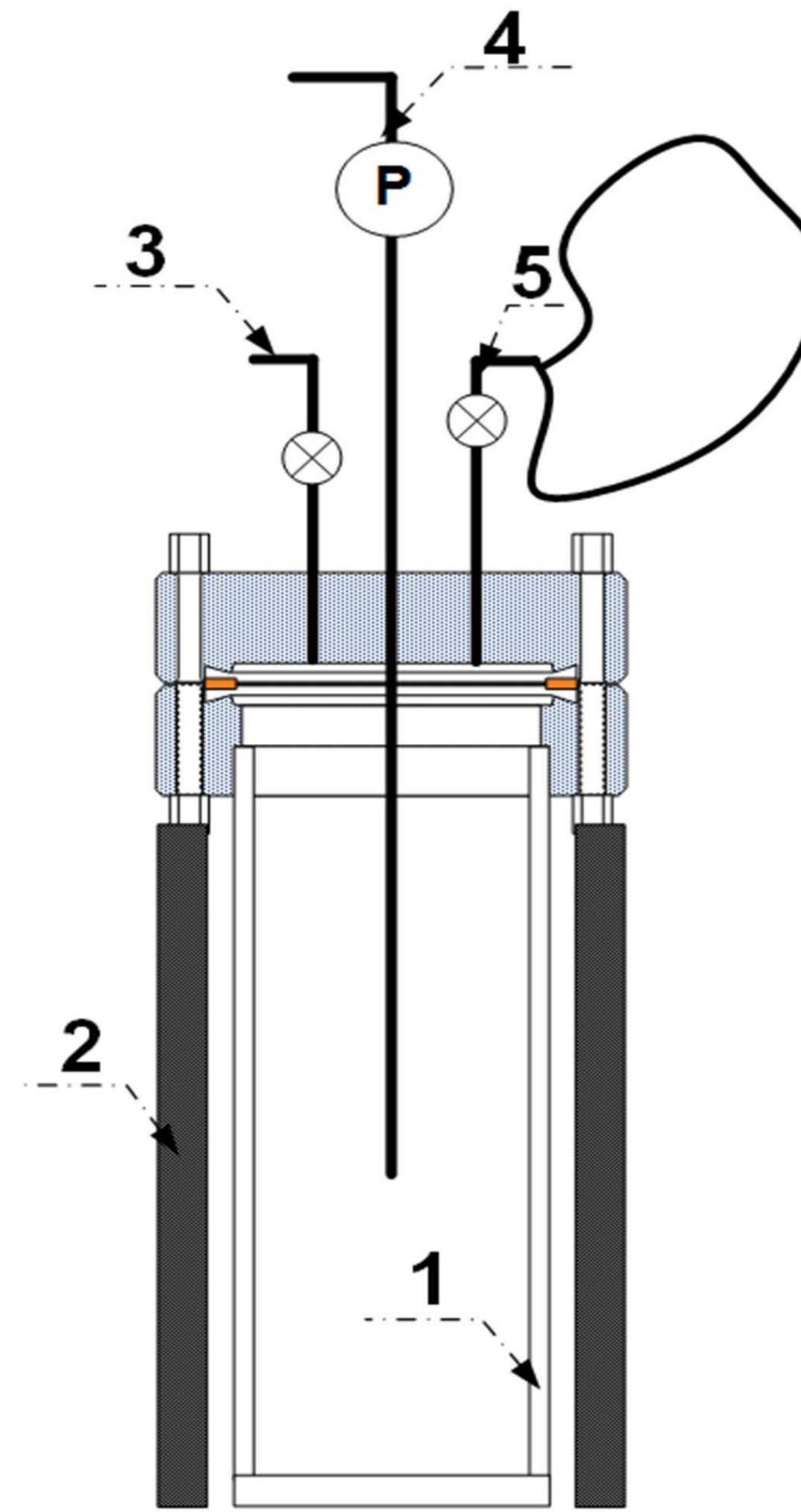
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Research Background

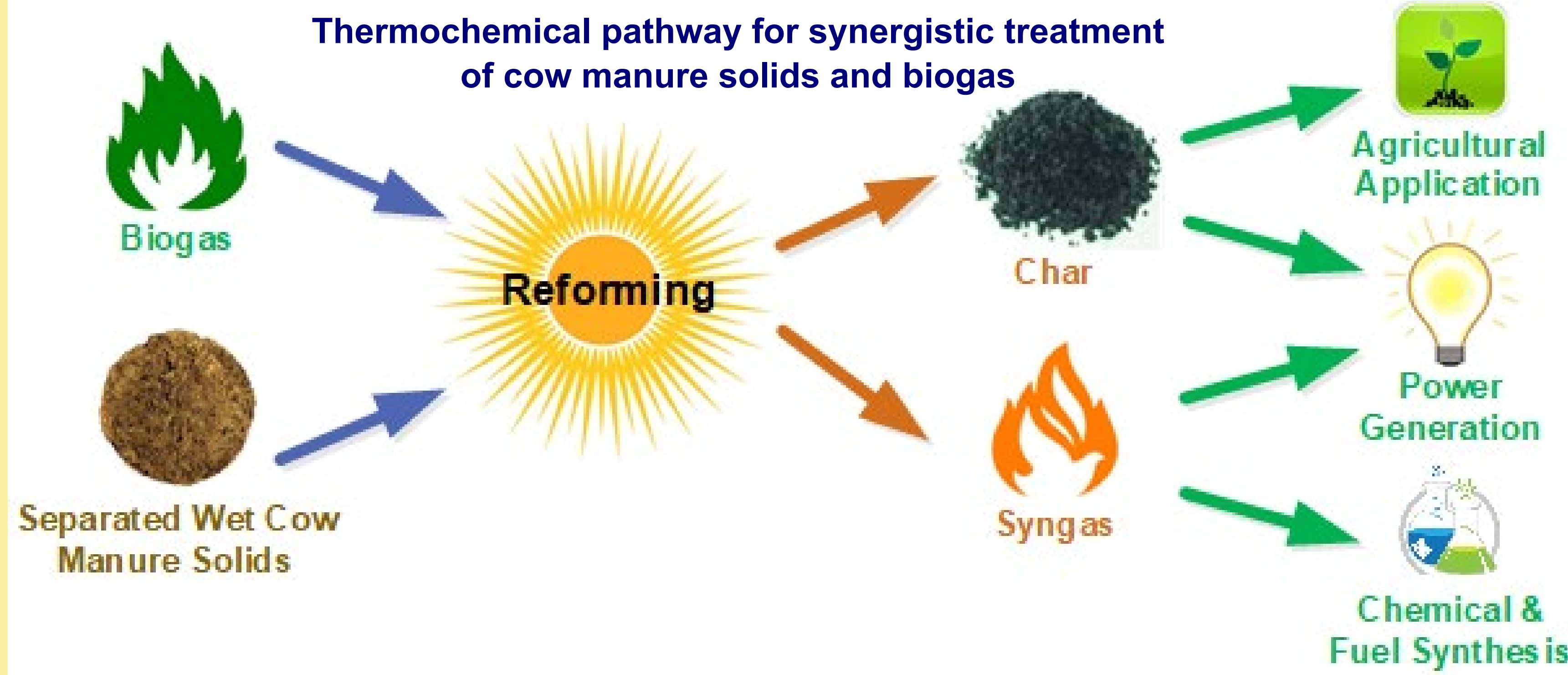
Sustainable methods for handling huge amounts of cow manure are highly demanded in California's agriculture-based areas, such as Kern County. Anaerobic digestion of cow manure is a commercialized biological process for energy recovery that produces biogas (the precursor of renewable natural gas). In addition to the major component of methane (CH₄), biogas contains a high volumetric concentration of carbon dioxide (CO₂) that can be over 40%, which lowers the energy content of biogas. Moreover, the anaerobic digestion process produces a byproduct, separated cow manure solids, which are reused as cow bedding but still contain harmful pathogens. Therefore, a synergistic treatment process was evaluated in this project to reduce the CO₂ in biogas and to stabilize solids simultaneously.

Experimental setup



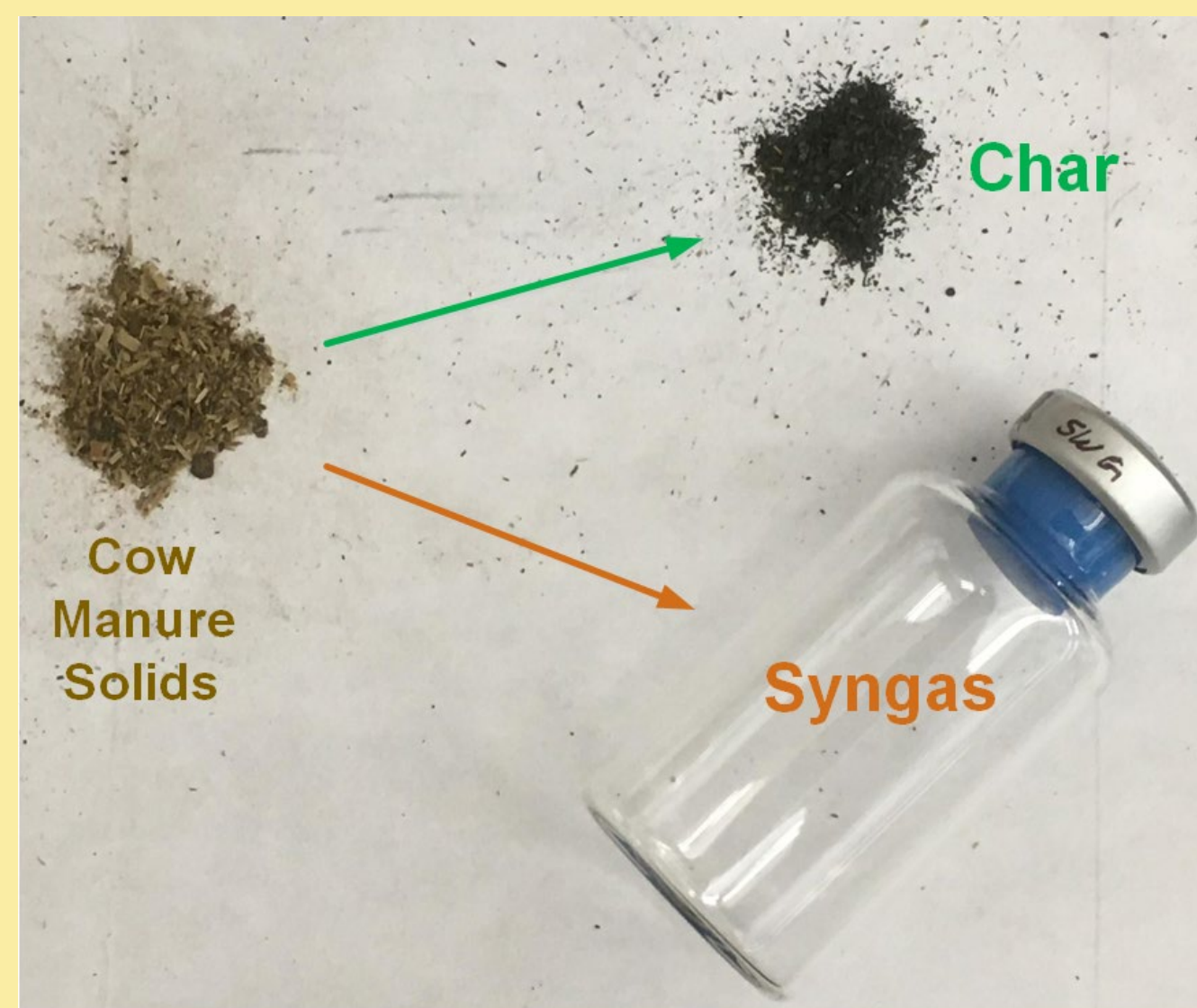
1. Reactor vessel
2. Radiative heater
3. Gas purge and release system
4. Thermocouple and pressure gauge
5. Gas collection system with Tedlar® bag

Thermochemical pathway for synergistic treatment of cow manure solids and biogas

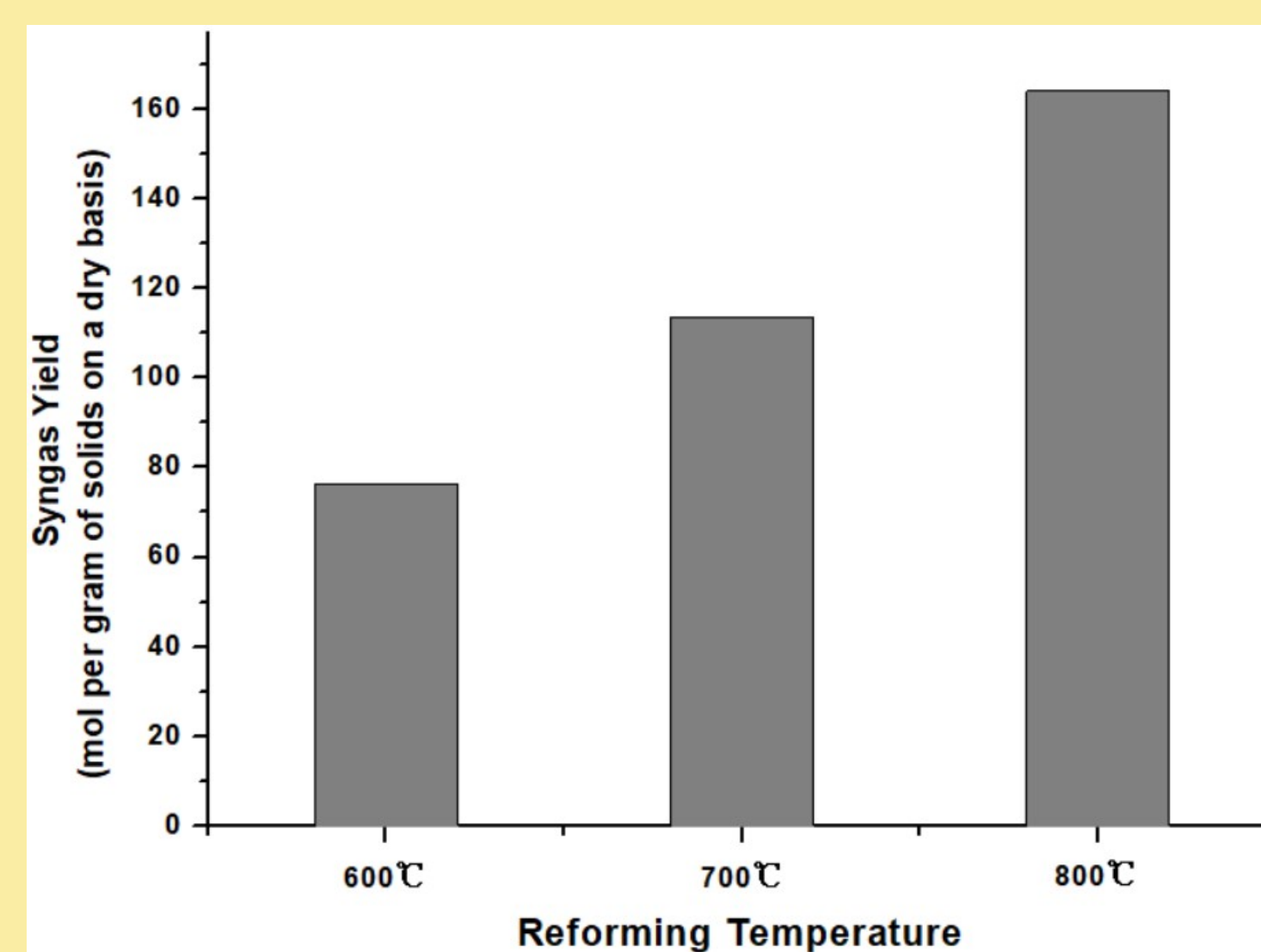


Preliminary Results

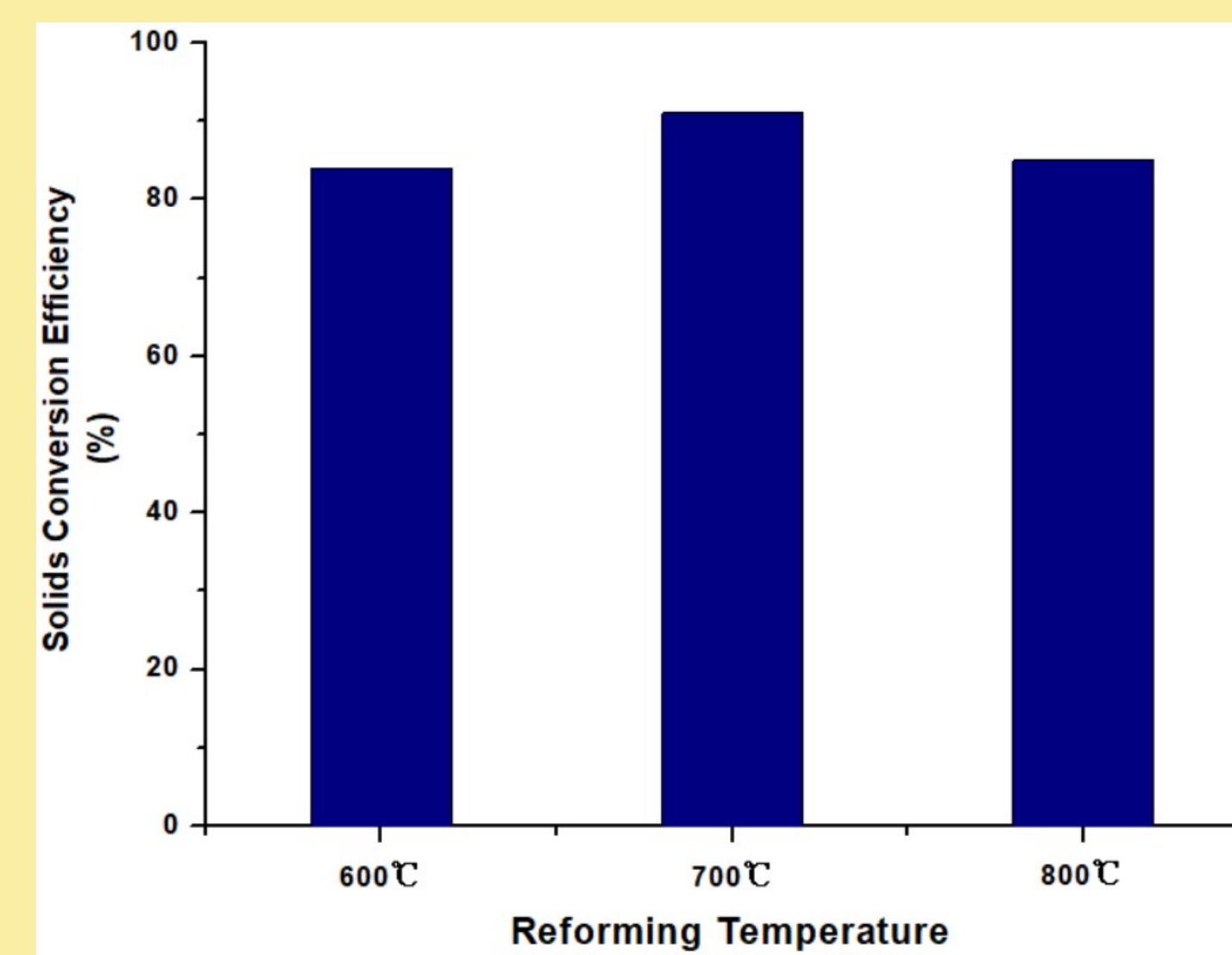
Cow manure solids are converted to char and energetic gas



Reforming temperature increases syngas yield



Solids conversion efficiency is high



Fun in the lab



Acknowledgements

CSUB NSME Summer Undergraduate Research Experience Program

