NASA SBIR/STTR Technologies

Proposal No. A2.02-9886 - Novel Catalyst Development for Synthetic Endothermic Fuels

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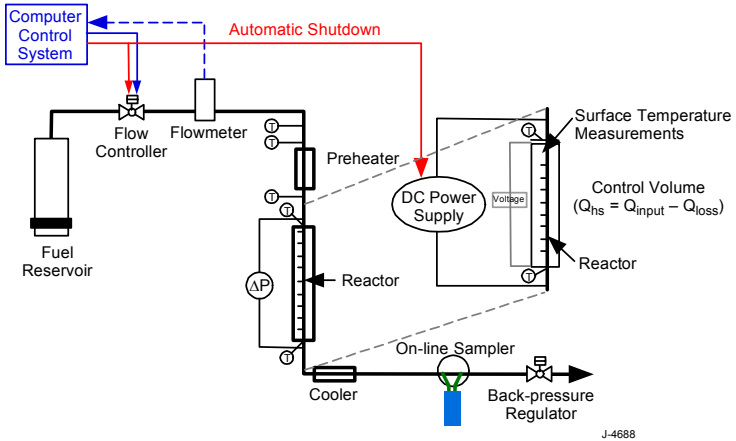
Identification and Significance of Innovation

Synthetic endothermic fuel and catalyst development is of interest for improvement of air breathing systems. These include ramjet, scramjet, Rocket-Based Combined-Cycle (RBCC), and high-speed aircraft engine applications. Particular concerns include insufficient cracking, coke production, sulfur emissions, and low heat sinks. PSI and UTRC propose 1) to synthesize new catalysts 2) measure physical characteristics of the catalyst 3) disperse catalyst homogeneously in synthetic endothermic fuel and 4) perform cracking studies using a synthetic endothermic fuel formulation while recording endotherms and product distribution by GC and GCMS.
Expected TRL Range at the end of Contract (1-9): TRL Range 1-3



Bench-scale endothermic fuel reactor test rig.

Technical Objectives and Work Plan

The specific objectives are as follows: synthesize catalyst compatible with the synthetic endothermic fuel; measure physical characteristics of the catalyst; and measure efficiency of catalyst in endothermic fuel.

The specific tasks are as follows: identify a standard operating procedure (SOP) to synthesize the catalyst; characterize catalyst by standard techniques; record total heat sink, endotherm, and product distribution due to hydrocarbon cracking; and summarize the 6-month progress with documentation and reporting of materials, experimental data, and calculations. Progress will be updated through bimonthly reports, lab notebooks, and communication by email and phone.

NASA and Non-NASA Applications

We believe that the proposed nanocatalysts will lead to significant improvement for NASA propulsion systems that rely upon synthetic endothermic fuels by increasing performance and system longevity.

DoD and DoE could benefit from advances in hydrocarbon cracking. AF has complementary ongoing programs using synthetic endothermic fuels. Alternative catalysts in crude and processed bio-oil could yield new approaches for producing renewable energy for DoE/DoD, in commercial markets such as the automotive and heating industry.

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NON-PROPRIETARY DATA