Natural Gas Combustor as Hybrid Heating Source for Solar Thermal Loop (CSPCore-3)

A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

Scientific Achievement:

Developed a natural-gas-fired combustor with near-zero NO_x emissions and low temperatures as a hybrid heating source for the solar thermal Brayton cycle using supercritical CO_2 as working fluid.

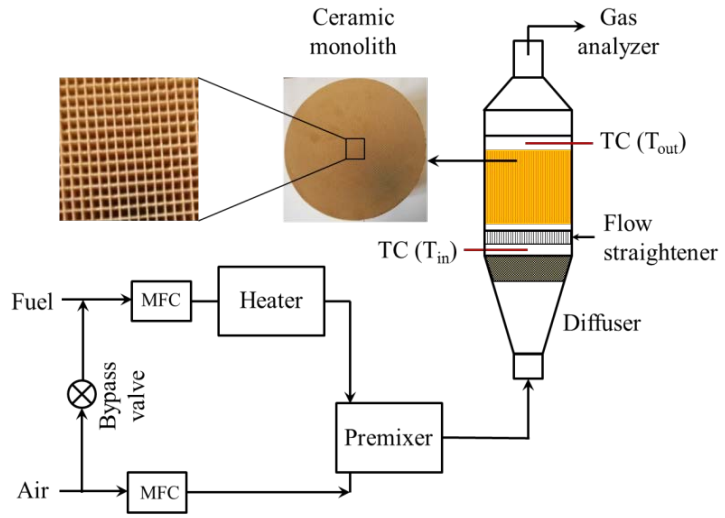
Significance and Impact:

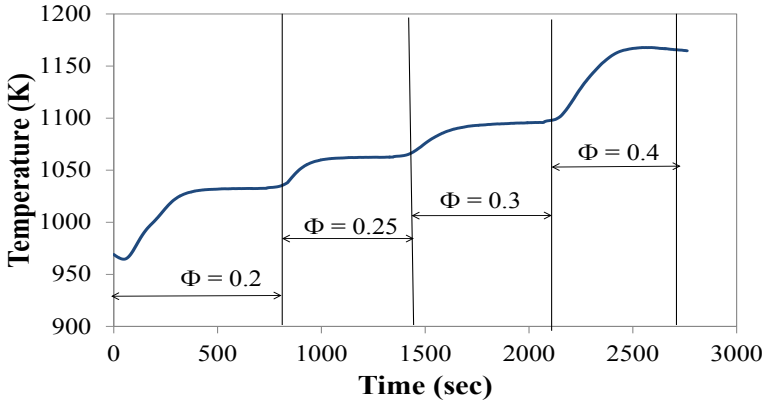
A single-stage combustor using lean catalytic combustion of methane was developed for a thermal power output of about 35 kW. Stable, ultra-lean operation of the combustor was successfully demonstrated at methane-air equivalence ratios as low as 0.2.

Research Details:

The highlights of the work are summarized below:

- Both ceramic and metallic monoliths with platinum catalyst were used to fabricate the single-stage catalytic combustor.
- Combustor exhaust temperatures are in the range of 1,060–1,170 K for methane-air equivalence ratios (ϕ) in the range of 0.2–0.4. These low temperatures are desirable from the viewpoint of material limitations of the heat exchanger.
- Measured NO_x emissions are in the range of 1–2 ppm for the range of conditions studied.





Publication(s): Atanu Dolai, Ravikrishna, R. V. (2017) Experimental Studies on Lean Catalytic Combustion of Methane, 25th National Conference on IC Engines and Combustion (NCICEC), Suratkal, India, December 15–17, 2017.

Contact(s): Prof. R.V. Ravikrishna, Indian Institute of Science, Email: ravikris@iisc.ac.in