

Combustion characteristics of a small-scale combustor with a percolated platinum emitter tube for thermophotovoltaics(102.07.28-102.08.02)

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### Abstract

A small-scale combustor is one of the most important components in developing the small-scale thermophotovoltaic (TPV) power systems. In order to enhance the flame stabilization and to have a bright incandescent emitter, a platinum tube is used to serve as an emitter. However, a bright incandescent emitter is limited by the operating range of flow velocity and fuel concentration. In the present study, a novel combustion chamber design is proposed to overcome the critical heat loss and flame instability by using a percolated platinum tube as catalyst, emitter, and flame stabilizer. Experimental measurements are performed to verify the performance of the proposed percolated-platinum combustor as compared to a plain platinum combustor. The effects of fuel/air distribution and inlet flow velocity on the performance of the small-scale combustor are reported. Concept, design, and demonstration of the combustor are addressed and discussed in the paper.

Keyword : Small-scale combustor; Hydrogen; Catalytic reaction; Thermophotovoltaic (TPV); Platinum tube