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Adjacent Electrode Configuration for Electrically Stabilized Flames

Embedded electrode design stabilizes flames and suppresses noise/emissions without flame contact.

Researchers at Purdue University have developed an embedded electrode design to allow manipulation of flames via electric fields. This work builds upon the technology 2023-KING-70043 by moving all electrodes out of the flame to greatly expand the practicality of the electric field method. The new electrode design has the two critical features needed for dynamic flames stabilization: the ability to create flame stabilization points in the gas flow and the ability to modulate the flame heat-release, which is required for suppressing thermoacoustic instabilities. Possible applications of this technology include industries that use continuous combustion processes with gaseous fuels and are looking to reduce emissions. Examples include gas turbines for electricity generation, residential devices (boilers, furnaces), and industrial devices (furnaces, boilers). This electric field stabilization method helps burner and appliance manufacturers reduce harmful emissions by suppressing adverse combustion dynamics and extending the burner operating range.

Technology Validation:

This technology has been validated through experiments conducted at Purdue University.

Advantages:

-Cost-effective way to improve flame stability

-Enables use of green fuels and leaner air-fuel mixtures

-NOx emissions reductions

-Noise reductions

Applications:

Technology ID
2024-CRUI-70476

Category
Aerospace & Defense/Thermal Management & Combustion Optimization
Semiconductors/Devices & Components

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-Power generation

-Residential heating

-Industrial processes

TRL: 4

Intellectual Property:

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