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High-Temperature Low-Cost Heater Lamp

Background

High-temperature heaters have many applications, including the high-temperature processing of materials. As fossil fuel burners, such as natural gas burners, are replaced with renewable alternatives, the number of applications will increase. Conventional high temperature electrical heaters have been based on silicon carbide or molybdenum disilicide. However, the efficient application of conventional solutions has been limited due to high cost, low power density, slow ramp rate, and/or sensitivity to particular chemical environments.

Invention Description

Researchers at Arizona State University have developed a new radiant heater lamp that is able to achieve temperatures up to and possibly exceeding 1700 °C. The lamp is able to heat and cool rapidly and features higher power per unit heater area than conventional heaters.

The heater lamp consists of a refractory ceramic envelope, evacuated or filled with some amount of inert gas, and an internal refractory conductive (e.g., metal such as tungsten) filament or ribbon as the active heating element. The ceramic envelope is chemically inert, impervious to gasses, and transparent or translucent in the infrared (IR) part of the electromagnetic (EM) spectrum. This allows radiant heat from the filament to leave the lamp without substantial heating of the envelope, ensuring efficient heat transfer out of the lamp. Depending on the application, the heater lamp may be single- or double-ended.

Potential Applications

- Heater lamps
- Furnaces

Benefits and Advantages

- Achieves high ramp up/down rates with high operating temperature
- Low cost
- High power per unit heater area

[Faculty Profile of Professor Ivan Ermanoski](#)

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