

MICROWAVE PLASMA BURNER

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An apparatus for generating flames and more particularly the microwave plasma burner for generating high-temperature large-volume plasma flame was presented. The plasma burner was composed of microwave transmission lines, a field applicator, discharge tube, coal and gas supply systems, and a reactor. The plasma burner is operated by injecting coal powders into a 2.45 GHz microwave plasma torch and by mixing the resultant gaseous hydrogen and carbon compounds with plasma-forming gas. We in this work used air, oxygen, steam, and their mixtures as a discharge gas or oxidant gas. The microwave plasma torch can instantaneously vaporize and decompose the hydrogen and carbon containing fuels. It was observed that the flame volume of the burner was more than 50 times that of the torch plasma. The preliminary experiments were carried out by measuring the temperature profiles of flames along the radial and axial directions. We also investigated the characteristics for coal combustion and gasification by analyzing the byproducts from the exit of reactor. As expected, various byproducts such as hydrogen, carbon monoxide, carbon dioxide, hydrogen sulfide, etc. were detected. It is expected that such burner can be applied to coal gasification, hydrocarbon reforming, industrial boiler of power plants, etc.

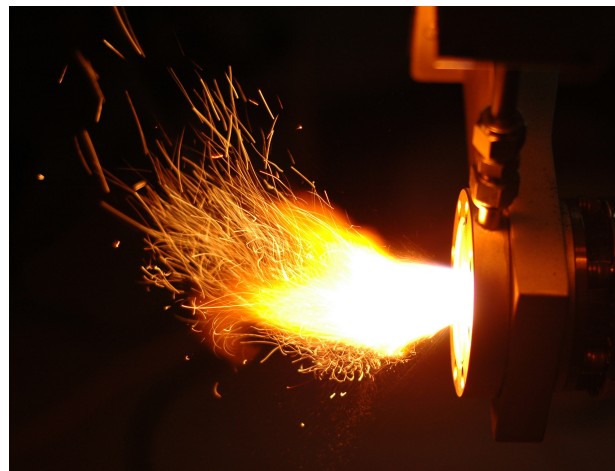


Fig 1.