

Abstract Submitted
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A novel microwave plasma combustor toward understanding plasma assisted ignition and plasma assisted combustion of methane/air mixtures¹ CHUJI WANG, WEI WU, Mississippi State University, LASER SPECTROSCOPY AND PLASMA TEAM — A novel microwave plasma combustor has been developed to study mechanisms of plasma-assisted ignition (PAI) and plasma-assisted combustion (PAC). The system allows us to inject a 2.45 MHz atmospheric argon microwave plasma jet directly into a combustion reaction zone to investigate effects of PAI and PAC. Three distinct zones: a pure plasma zone, a plasma-combustion hybrid zone, and a combustion zone are investigated by optical emission spectroscopy (OES) and cavity ringdown spectroscopy (CRDS) of OH, etc. plasma and combustion intermediates. The experimental results allow us to understand the formation of OH radicals and roles of OH in PAI and PAC of methane-air mixtures in a wide range of fuel equivalence ratios ranging from rich to lean burn. A U-curve of plasma power versus fuel equivalence ratio in the PAI of methane-air mixtures is observed. The roles of OH in PAI and PAC of premixed methane-air flames around the flammability limit are discussed.

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