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Hydrogasification of Coal using Atmospheric Pressure Microwave Plasma¹ YONGHO KIM, HANS ZIOCK, LOUIS ROSOCHA, GRAYDON ANDERSON, DON COATES, GABRIEL BECERRA, ELIJAH MARTIN, VINCENT FERRERI, JAEYOUNG PARK, TSITSI MADZAWA-NUSSINOV, Los Alamos National Laboratory — A clean coal technology is a newly highlighted research field because coal is America's largest domestic energy source and coal can be gasified to methane or hydrogen. However, the coal gasification process has encountered technical barriers because no reliable sulfur-tolerant chemical catalysts exist. Los Alamos National Laboratory has proposed a plasma catalyzed coal gasification concept, where plasma turns coal and reactant gases into highly reactive free radicals and excited species, which are believed to promote gasification reactions. We have developed an atmospheric pressure microwave plasma system using a 2.45 GHz magnetron. In this paper, we report the preliminary results on the hydrogasification of coal ($C + 2H_2 \diamond CH_4$). Stable plasma conditions will be explored with pulverized coal powders, as functions of hydrogen flow, and applied power. UV/IR spectroscopic measurements will be carried out to characterize the plasma properties and correlate these to hydrogasification reactivity.

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