

Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Plasma-assisted dry reforming of methane in atmospheric AC gliding arc discharge XIN TU, HELEN J. GALLON, J. CHRISTOPHER WHITEHEAD, School of Chemistry, The University of Manchester, Oxford Road, Manchester M13 9PL, UK, PLASMA CHEMISTRY GROUP TEAM — Plasma-catalytic dry reforming of CH_4 with CO_2 has been carried out in an atmospheric pressure gliding arc reactor. Two semi-ellipsoidal Al plates coated with different materials (Ni, Zn and Cu) are used as electrodes. The plasma arc dynamic has been investigated by means of electrical diagnostics and high speed photography. Different arc breakdown regimes are reported, and the restrike mode is identified as the typical fluctuation characteristic of the gliding arc in CH_4/CO_2 mixture. In addition, global thermodynamic equilibrium calculation for dry reforming of CH_4 has been carried out. The effects of both plasma (reactor geometry, coating material and arc power) and process parameters (feed flow rate and CH_4/CO_2 molar ratio) on the conversion, product selectivity and energy efficiency of the process have been investigated to get optimal operating parameters for the reaction. The possible reaction mechanisms involved in the plasma dry reforming chemistry are also suggested.

Xin Tu
School of Chemistry, The University of Manchester,
Oxford Road, Manchester M13 9PL, UK

Date submitted: 11 Jun 2010

Electronic form version 1.4