

## **PLASMA ASSISTED CONVERSION OF PYROGAS**

Fela Odeyemi, Alexander Rabinovich and Alexander  
Fridman

*Drexel University, 3141 Chestnut street Philadelphia, PA  
19104 USA*

Pyrogas - a fuel gas formed from the pyrolysis or gasification of Biomass or Coal - usually contain large amounts of heavy hydrocarbons (tar) and unreacted light hydrocarbons (CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>), that decreases its value and require significant cleaning. The conversion of Pyrogas into synthesis gas (a combination of CO and H<sub>2</sub>) in varying quantities in the presence of Plasma discharge in the form of Gliding arc Plasma is effectively demonstrated and studied. A special low current gliding arc plasma reactor, 'plasmatron', is designed to provide plasma discharge in a reforming zone for reforming reactions. The Gliding arc plasma reactor (plasmatron) is a non thermal reformer which offers better selectivity, reactivity and efficiency compared to conventional catalytic reformers <sup>1</sup>.

The reforming reaction is carried out under endothermic conditions using steam reforming and the gliding arc discharge provides a mixture of electrons, excited atoms and molecules, ions, radicals and photons <sup>2</sup>. Pyrogas Reforming results obtained were compared to thermodynamic simulations while considering yield, efficiency and power consumption at varying H<sub>2</sub>O/C ratios and temperatures.

1. G. Petitpas, J.D. Rollier, A. Darmon, J. Gonzalez-Aguilar, R. Metkemeijer, L. Fulcheri, "A comparative study of non thermal plasma assisted reforming technologies", International Journal of Hydrogen Energy 32 (2007) 2848-2867.

2. F. Michael Lewis, Clarence M. Ablow, "Pyrogas from Biomass", Conference on capturing the sun through Bioconversion, March 10-12, 1976, presented by the Stanford Research Institute. 15 pp.