

Abstract Submitted  
for the GEC15 Meeting of  
The American Physical Society

**Student Award Finalist: Transient Analysis of Pulsed Dry Methane Reforming in DBD-Catalyst Hybrid Reaction** KEISHIRO TAMURA, SEIGO KAMESHIMA, YUTARO ISHIBASHI, RYO MIZUKAMI, TAKUMI YAMAZAKI, TOMOHIRO NOZAKI, Tokyo Institute of Technology — Pulsed dry methane reforming in DBD-catalyst hybrid reaction was investigated. Optical emission spectroscopy was also employed for the better understanding of reaction mechanism for enhanced CH<sub>4</sub> and CO<sub>2</sub> conversion as well as carbon removal reaction. Strong emission from C<sub>2</sub> high pressure Swan system was uniquely observed when the Boudouard reaction dominates the surface reaction: C<sub>2</sub> molecules were selectively produced via vibrationally excited CO which is originated from the adsorbed carbon on the catalysts. Time dependent change in gas composition and optical emission profiles of CO Ångström and C<sub>2</sub> high pressure Swan systems were correlated in a systematic and consistent manner, leading to the deep insight into the CH<sub>4</sub> and CO<sub>2</sub> activation mechanisms over solid catalysts. Moreover, individual contribution of radical injection and heat generated by DBD were investigated. The result clearly showed that the CH<sub>4</sub> and CO<sub>2</sub> conversion rates were increased essentially by the radical injection, not the thermal effect of DBD.

Keishiro Tamura  
Tokyo Institute of Technology

Date submitted: 18 Jun 2015

Electronic form version 1.4