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 CH4 and CO2 conversion as well as carbon removal reaction. Strong emission from C2 high pressure Swan system was uniquely observed when the Boudouard reaction dominates the surface reaction: C2 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 C2 high pressure Swan systems were correlated in a systematic and consistent manner, leading to the deep insight into the CH4 and CO2 activation mechanisms over solid catalysts. Moreover, individual contribution of radical injection and heat generated by DBD were investigated. The result clearly showed that the CH4 and CO2 conversion rates were increased essentially by the radical injection, not the thermal effect of DBD.

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