Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Dependence of MnOx Catalyst Position on Toluene Decomposition using Nanosecond Pulsed Discharge Plasma JUNKAI HAN, AKIHIKO OGASAWARA, Kumamoto University, JINLONG WANG, Tsinghua University, DOUYAN WANG, TAKAO NAMIHIRA, MITSURU SASAKI, HIDENORI AKIYAMA, Kumamoto University, PENGYI ZHANG, Tsinghua University, KUMAMOTO UNIVERSITY COLLABORATION, TSINGHUA UNIVERSITY COLLABORATION — Plasma catalysis, which combines advantages of high selectivity due to the catalysis and with fast ignition and response due to plasma technique, appears to be a promising technology to simultaneously resolve both efficiency and workability issues. In practice, a catalyst can be combined with NTP in two ways: by introducing the catalyst in the discharge zone (in-plasma catalytic reactor) or by placing the catalyst after the discharge zone (post-plasma catalytic reactor). This work aims to clarify combined effects by coupling MnOx catalyst with ns pulsed discharge system for decomposition of 100 ppm toluene utilizing three methods: plasma alone, in-plasma catalytic and post-plasma catalytic methods, in atmospheric pressure at room temperature. As the results, toluene removal ratio reached 100% at approximately 50 J/L under the in-plasma catalytic and post-plasma catalytic methods, while it was 70% under the plasma alone method. The concentrations of O3, HCOOH, and CO under the plasma alone method were higher compared with the in-plasma catalytic or post-plasma catalytic methods. CO2 selectivity under the post-plasma catalytic method was the highest of these three methods when toluene removal ratio exceeded 80%.

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Date submitted: 17 Jun 2015 Electronic form version 1.4