Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Synthesis of Cerium Oxide Nanoparticles by Atmospheric-pressure Pulsed Discharge Plasma WANYING ZHU, WAHYU DIONO, HIDEKI KANDA, MOTONOBU GOTO, Department of Materials Process Engineering, Nagoya University, Japan, GOTO'S LAB TEAM — Cerium oxide nanoparticles have attracted much attention because of their excellent catalytic activities, which have been used in various fields. Various methods to synthesize cerium oxide nanoparticles have been reported, such as hydrothermal, solvothermal, thermal decomposition. In this work, a novel method is proposed using atmospheric-pressure pulsed discharge plasma in a slug flow capillary reactor system, which has a low operating cost and easy implementation. In the slug flow capillary reactor system, liquid-gas motion was generated in a glass capillary tube by flowing feed solution and argon gas simultaneously. The bipolar pulsed output voltage (10 kV) was applied to the bubble motion via the copper plate attached to the glass tube surface. Cerium nitrate or ammonium cerium nitrate solution was used as feed solution. The produced cerium oxide nanoparticles were characterized by transmission electron microscopy (TEM). Different stabilizers were used to prevent nanoparticles aggregation, including starch, proline, and glycine. Catalytic activities of products are also investigated by photocatalytic degradation of methylene blue in aqueous solution under UV light conditions.

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Date submitted: 17 Jun 2020 Electronic form version 1.4