A key feature of Diesel Oxidation Catalyst (DOC) is its ability to efficiently oxidize CO and hydrocarbons (HCs) at the diesel exhaust temperature levels. While the DOC technology has progressed to the point where CO and HCs emissions can be drastically reduced, there remain issues of cost and low temperature activity i.e., cold start engine regime. Recent development researches try to adapt a cost-effective integrated solution combining non-thermal plasma (NTP) and DOC technology for diesel applications.

This study is mainly focused on the simulating HCCI Diesel exhaust treatment efficiency together with reducing activation temperature when a commercial DOC (Pt/Pd/Al2O3) in monolith form was connected downstream to a multi-DBD cells reactor driven by a high voltage, high frequency AC generator (11 kV-15 kHz). Light-off temperatures (LOF) for CO and HCs oxidation were determined by temperature programmed surface reaction (TPSR) by passing the gas flow over the different configurations (DOC, plasma, and plasma-DOC) while increasing the temperature from 80°C to 500°C. The outlet flows were analyzed continuously using Pierburg bay and electrochemical analyzers (O2, CO, CO2, HCs, NO and NO2) and FTIR spectrometer (reaction by-products).

LOF temperature of DOC catalyst for CO and HCs oxidation in test bench scale can be significantly improved if catalyst is combined with NTP and can be a new approach to improve the emission control, especially during the cold start phase. Also, the plasma reactor can play a role in the improvement of NH3-SCR at cold start by controlling the NO/NO2 ratio.

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