SIMULTANEOUS CONTROL OF NO_x AND PARTICULATES USING PLASMA-ASSISTED CATALYSIS

Raymond Brusasco
Lawrence Livermore National Laboratory

Plasma schemes are being investigated at various laboratories for controlling either NO_x or particulate emissions. The objective of this work is to assess and demonstrate the feasibility of plasma-assisted catalysis for the simultaneous control of both NO_x and particulates in heavy-duty diesel engine exhaust. The desired scheme involves using a single plasma system for achieving non-thermal plasma-enhanced catalytic reduction of the NO_x and thermal plasma oxidation of the particulates. A key issue is whether the electrical power consumption for thermal plasma oxidation of the particulates is compatible with that for non-thermal plasma conversion of the NO_x. We performed bench-scale tests to demonstrate the feasibility of a plasma regenerated particulate filter. The soot oxidation was characterized and it was observed that direct exposure of a soot layer to the plasma resulted in complete oxidation to $C0_2$. The specific energy density for soot oxidation was measured and shown to be compatible with that required for simultaneous conversion of NO_x.