

Nitric Oxide Reduction of Diesel Exhaust Gas with Dielectric Barrier Discharge

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The regulations of diesel exhaust emissions become stricter, so intensive. In plasma treatment, typical discharge system can be considered as long-life devices with low maintenance service necessary. Also it is finely controllable and it has possibility to efficiently use feedback. These features make using electrical discharge more attractive. But the insulation problems because of using of high frequency and special form of signal make it difficult to apply in vehicles. The present work continues our investigations on engine emissions treatment with discharges assistance. We designed variations of electrode sized DBD (dielectric barrier discharge) plasma sources in order to reduce the NO (Nitric Oxide) content of a diesel engine exhaust. The principal part is the quartz pipe with adjoined to outer grounded electrode and internal electrode. Initial experiments were made with model gas simulating the diesel exhaust. It consist mostly of N₂ with an addition of O₂ 0-15% and NO about hundreds of ppm. Discharge frequency has a crucial impact on equipment performance and gas treatment. The plasma source supply frequency was varying from 800 Hz to 2.2 kHz. A 90 % decreasing of NO was obtained at 0.8 - 1 kHz.