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Removal of NOx in Corona Discharge at Atmospheric Pressure with High Voltage Electrode Material Variation

K. Hensel, M. Morvova
Gruppe for elektron- og ionefysikk, Institutt for fysikk, Norges Tekniske Høgskole, N-7034 Trondheim, hensel@phys.unit.no

The spatial chemical process and effectiveness of NOx removal at relatively high pressures under the influence of corona discharge were investigated. Also the influence of inner electrode (wire) material on the discharge behavior and the surface products analyses of the outer electrode are reported. Experiments were carried out using corona discharge of both polarities and products were analyzed by infrared (IR) absorption spectrometry. A special attention was paid to calibration measurements of NO and NO2 at various pressures.

Experimental set-up consists of wire winded on the glass tube placed over the pate electrodes situated in the IR absorption gas cell. Different material of inner electrode (wire) was treated in experiments.

The results showed that negative corona discharge is more stable, but its deNOx effect is often very unpredictable (deNO is usually very effective, but deNO2 more or less increases when also NO is present). In positive polarity deNO efficiency is about the same, but in all cases also NO2 decreases. Both deNO and deNO2 processes at lower partial pressures (approximately 50 Torr) are more efficient in positive corona. At higher pressure (more than 200 Torr) is the effect of both polarities about the same. Experiments showed that mostly deNO2 processes are materially depending. Change in N2O concentration seems to be very important.