PO4049

Photocatalytically supported dielectric barrier discharge for waste gas treatment

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Biological sources of air pollution like animal farms, food processing, waste water and solid waste treatment industries are areas of increasing concern as the risks posed by the pollutants from these sources are understood more profoundly. The current method investigates the possibility of using a low temperature plasma for treatment of pollutant gases. Multiple parallel powered steel electrodes are separated with ceramic plates to create a dielectric barrier discharge (DBD).
However, studies on DBD treatment of waste gases with high levels of methane show an inadequate decomposition efficiency of only a few percentage. The highly symmetric methane molecule withstands the chemical reactions of the plasma produced ozone.
Spectroscopic investigations show that the blue-violet light emission origins from the 2nd positive system of nitrogen as the rotational-vibrational band from the state $C^3\Pi_u$ to $B^3\Pi_g$. This emission between 300 an 400 nm is sufficient to activate photokatalytic materials like titanium dioxide or other metal oxides. In combination with adsorber materials a long residence time in the reactive area for an improved de-polluting can be achieved.
The first set-up with photokatalytical equipped barrier plates will be presented. The effect on the plasma generation and first investigations on the methane reduction efficiency will be shown.

Keywords
Dielectric barrier discharge
photo catalysis
waste gas treatment
optical emission spectroscopy