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Combination of atmospheric pressure dielectric barrier discharge and photocatalysis for C_2H_2 oxidation FREDERIC THEVENET, CHANTAL GUILLARD, LACE UCB-Lyon1 UMR CNRS 5634 blvd 11Nov.1918 69100 Villeurbanne France, OLIVIER GUAITELLA, ANTOINE ROUSSEAU, LPTP Ecole Polytechnique 91120 Palaiseau — Non-thermal plasma and photocatalysis have attracted attention as energy-saving methods for VOCs destruction. TiO_2 photocatalysts are porous semiconductors activated by UV radiations. They are known for their ability to oxidize organic molecules with high CO_2 selectivity. It was shown recently that the coupling of dielectric barrier discharges (DBD) with photocatalysis improves oxidation efficiency and reduces undesirable by-products. Experiments were carried out in a closed DBD reactor containing photocatalytic surface, with C_2H_2 as a test molecule. First, TiO_2 influence on DBD deposited energy was investigated, as well as ageing of TiO_2 under DBD conditions. Then, air cleaning efficiency of coupling was investigated. Introduction of higher specific energy and addition of UV radiations increase the synergistic effect. Selectivity is clearly enhanced. The CO amount is reduced in presence of TiO_2. CO_2 formation is improved. Experimental data were fitted by kinetics models. Constants were calculated and reaction mechanisms are reported. Understanding of plasma-TiO_2 synergy has been improved by in situ and time resolved laser absorption experiment in the mid infrared region

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