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Infrared laser diagnostics of the plasma-photocatalyst interaction in a pulsed low pressure discharge OLIVIER GUAITELLA, FREDERIC THEVENET, ANTOINE ROUSSEAU, LPTP-Ecole Polytechnique CNRS, Palaiseau, France, CHANTAL GUILLARD, LACE-Lyon-France, GABI STANCU, JURGEN ROEPCKE, INP-Greifswald-Germany — The combination of a plasma with a porous semi-conductor surface (TiO_2 photocatalytic material) has been recently reported to oxidize volatiles organic compounds (VOC) at a low energy costs [1]. However, activation mechanisms of the photocatalytic surface by the plasma are not clearly identified to the day. In order to improve the understanding of the synergy of the plasma-photocatalysis combination for C_2H_2 removal, time resolved in-situ measurements of infrared laser absorption spectroscopy are performed in a low pressure pulsed DC discharge in air containing less than 1000 ppm of C_2H_2. The time resolution of the infrared lead-salt diode laser is about 1ms. Time resolved measurements are carried out during a series of single pulses (10 to 100 ms) in a closed plasma reactor. It is shown that the combination of TiO_2 with external UV irradiation leads a strong enhancement of the C_2H_2 oxidation rate under plasma exposure. Similarly, adsorption/desorption characteristic time of C_2H_2 on TiO_2 is modified by the presence of the plasma.
[1] S. Futamura, H. Einaga, H. Kabashima, L.Y. Hwan, Catal. Today 89, 89 (2004).

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