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Plasma-photocatalysis combination for air pollutant removal: identification of the synergy mechanisms O. GUAITELLA, F. THEVENET, A. ROUSSEAU, LPTP, Ecole Polytechnique, CNRS, Palaiseau, France, C. GUILLARD, LACE, UCBL, CNRS, Lyon, France, G. STANCU, J. ROEPCKE, INP, Greifswald, Germany — The coupling of a photocatalyst with a non thermal plasma (DBD) is studied; based on experimental results we discuss separately the contributions of (i) the chemistry involved as a function of the porosity of the material, and (ii) the influence of the photocatalytic activity on the chemistry of C2H2 oxidation. C2H2 removal is strongly increased by the presence of a porous material (SiO2 or TiO2): the destruction of C2H2 is driven by species created by the plasma and concentrated by a porous [1]. Our experiments confirm that C2H2 removal rate increases with the porosity of the material, whereas the selectivity also depends on the chemical composition of the surface. In parallel, the temporal evolution of C2H2 concentration was measured by Tuneable Diode Laser Absorption Spectroscopy (TDLAS) in the mid infrared region in a low pressure discharge during a single plasma pulse (one shot). The contribution of external ultraviolet radiation and plasma exposure were quantified, both with and without photocatalyst. The synergetic effect was clearly demonstrated [2].
[1] U. Roland, F. Holzer, F.-D. Kopinke 2002 Catalysis Today 73 315–323 [2] A. Rousseau, O. Guaitella, L.V. Gatilova, F. Thevenet, C. Guillard, J. Roepcke, G. D. Stancu , Appl. Phys. Let. 87, 221501 (2005).

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